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# Contents

This week...



# 08

## Black Friday

### 08 Black Friday

It's that time of year again. As well the odd fight or two in shopping centres across the land, there's also the chance you might be able to find a bargain or two. Where are the best places to shop, though, and the deals all they're cracked up to be?

### 18 Case Lighting

Once you've filled your PC case with all the fancy components you can find and afford, what can you do to make your system stand out? Well, this possible answer to that question is entirely frivolous, but it sure does look good! Mark Pickavance looks at what you need to light your case up

### 30 GoPro's Bad Karma

Most people these days have heard of GoPro. It's a company that has made a name for itself with its affordable action cameras. Now, though, it's expanding, and one of its new products, a drone, was recently released. Unfortunately, things not did not go according to plan...

### 50 Intel Motherboards Tested

You can get perfectly functional motherboards for £50 or even less, but spend over £100 and you get access to some great features you wouldn't get otherwise. To give you an idea of what's available at that kind of price, David Hayward has been looking at six Intel boards and seeing what they have to offer



# 18

## Case Lighting

# 26

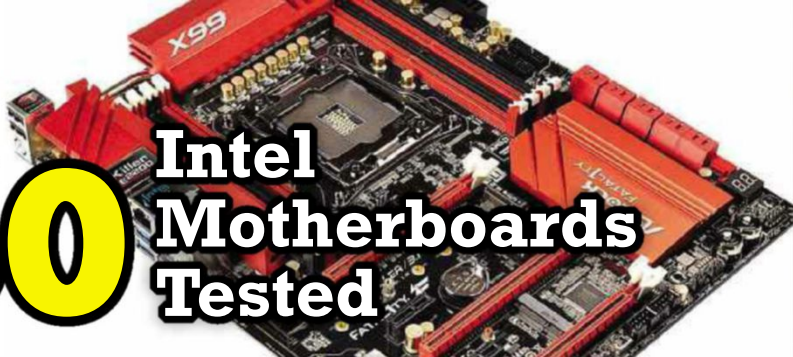
## GoPro's Bad Karma





# 50

## Intel Motherboards Tested



# 58

## The Best Superhero Games



## 58 The Best Superhero Games

Superheroes, eh? They spend all day running around with their underwear showing, punching people in the face, and they get videogames made about them. If we did that, we'd get arrested. Still, they really do make for some cracking games, and we've listed a few of our favourites here

## 60 Virtual Assistants

In spite of sounding like some kind of holographic secretary, virtual assistants are much more straightforward than that. That doesn't mean Siri, Cortana, and Google Now aren't highly capable services, though



## Also In This Issue...

### 56 Linux A To B

This week, we find ourselves settling on the letter L

### 57 Component Watch

Take a step up from HD with one of this week's great deals

### 66 Retro Gaming News

Dave Edwards tries to get to grips with a new, old-school game

### 67 Remembering...

What does the number 180 mean to you?

### 86 Crowdfunding Corner

James Hunt picks out a few smart new projects

### 87 App Of The Week

Bring back the joys of the BBC Micro with this week's app

## Buyer's Guide

### Intel Motherboards over £100

- 50 MSI Z170A Gaming Pro Carbon
- 51 MSI X99S SLI Plus
- 52 Gigabyte GA-X150M-PRO ECC
- 53 ASRock Z97 Extreme6
- 54 ASUS Maximus VIII Hero
- 55 ASRock Fatal1ty X99X Killer/3.1

## Reviews

- 42 Kolink Aviator V
- 43 Lexar Professional 633x microSDXC UHS-1 256GB
- 44 Venturer EliteWin S 11K
- 46 AOC U2777PQU
- 48 Fnatic Duel TMA-2 Modular Headset
- 49 Juice Nano Bar Speaker

## Experts

- 82 Ask Aaron
- 84 Ask Jason

## Specialists

- 68 Linux Mart
- 69 Amiga Mart
- 70 Mobile Mart
- 71 Hardware Mart
- 72 Gaming Mart

## News

- 36 The Latest News

## Regulars

- 34 Subscriptions
- 74 Ad Index
- 75 Classified Ads Form
- 76 IT Essentials
- 78 Classifieds
- 88 Logging Off



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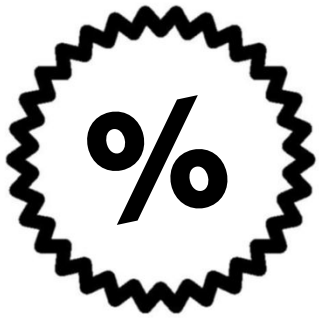
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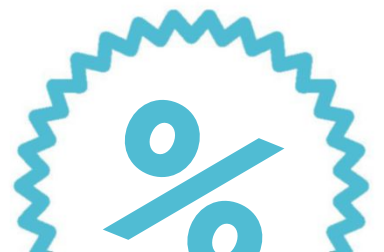
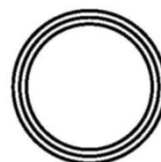
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# Bagging A Bargain

**It's time to whip out the credit card:  
Black Friday and Cyber Monday are back**





If you have snapped up this copy of Micro Mart on the day it made it to the shops – that is, 24th November 2016 – then let us be the first to wish you a very happy Thanksgiving. It may seem odd for us to do that given we don't actually celebrate this particular American festival here in the UK. But it's getting to the point where it's just about the only US event that we don't mark. Not yet, in any case.

Just as Halloween has arguably become even more popular than Bonfire Night and prom nights have fast become a staple of our children's schooldays, we're being influenced more and more by our cousins from across the pond. So while we don't have Thanksgiving, we do have its aftermath. And that means 25th November 2016 is more than just a normal "Yes, it's nearly the weekend" Friday. Instead, it's Black Friday and a chance for you to open your wallet and go crazy.

## “ Don't bother going to Asda, which pulled out of Black Friday last year ”

There's some confusion over how this day came to be an annual event in the UK, but we do recall seeing it in 2010. That's when Amazon – prompted by complaints from British shoppers that folk in the US were able to get cheaper goods on this day – began to offer a day of bargains for us too. Black Friday arguably took off on the high street in 2013 when Walmart-owned Asda kickstarted its own Black Friday sales, the result of which was a bumper 2014 when virtually every retailer got stuck in.

As you'll probably recall, that was the year of the TV wars, when the newspapers were filled to the brim with tales of shoppers scrapping in the aisles over cheap 40" Polaroid televisions and 50" models made by Blaupunkt, which were selling for £249. It didn't seem to matter that neither manufacturer is any sort of force in the TV market (although do watch out for the impressive, albeit HDR-less, 4K Polaroid P49D600). People queued for hours to get them and later flooded eBay in the hope of making a few quid.

Such scenes were repeated last year, and it even led to calls by MPs to ban the event. Yet there were some bargains to be had. Retailer KRCS slashed £345 off iMacs, snapped £305 from MacBook Pros and eased pockets by £211 on Mac Minis. There were iPads with 8% discounts, Xbox One consoles going for £229, Amazon Fire tablets down by a third and £600 off a 60" Samsung 4K television.

So with the event upon us once more, should we be taking any notice? Of course! For us tech-heads, there is a great

### Why Is It Called Black Friday?

The origin of the phrase is unclear. Some believe the term Black Friday was created by the police in Philadelphia who were overburdened by the sheer number of people visiting the city on that day. Others think the name marks the day when shops were able to make a profit, freeing themselves of debt and going 'into the black'.

### Are The Bargains Genuine?

An investigation by the consumer group Which? showed some alleged bargains last year were anything but. They said prices of some items fell even further following this annual sale, while other products were deliberately made more expensive in the months beforehand so it looked as if a good deal was being had.

Its researchers looked at 20 products on AO.com, Argos, Amazon, Currys and John Lewis and found 49% of items were less expensive before or after Black Friday last year. It pointed to an LG Soundbar, for instance, that was £230 in September 2015 being sold for £239 on Black Friday. There was a Samsung television for £748, which had been selling previously as low as £699.

On the back of this, we inputted some Black Friday bargains into CamelCamelCamel.com to check whether the deals really were cheaper than normal this time around, purely looking at Amazon.

#### Sony Bravia 65" Android 4K HDR television

Highest Amazon price:

£1,699

Previous lowest dip:

£1,467.93

Black Friday price: £1,299



#### LG 55" Ultra HD 4K Smart TV

Highest Amazon price: £999

Previous lowest dip: None

Black Friday price: £599



#### Bluedio Vinyl Plus Light Extravagance headphones

Highest Amazon price: £219

Previous lowest dip: £134.99

Black Friday price: £106.99



#### Netgear R6400 router

Highest Amazon price: £190

Previous lowest dip: £109.99

Black Friday price: £99.99



#### Parallels Desktop 10 for Mac

Highest Amazon price:

£64.95

Previous lowest dip: £26.99

Black Friday price: £21.96



#### LG SH6 all-in-one sound bar

Highest Amazon price:

£399.99

Previous lowest dip: £209.99

Black Friday price: £209.99





## How To Bag A Black Friday Bargain

It can pay to be prepared over the Black Friday/Cyber Monday weekend. Here are our tips for a successful bargain hunt.

### Start following the retailers

We're not suggesting you start chasing shop managers around their stores or turning up at their front doors unannounced. Rather, get on Twitter and Facebook and start following stores such as Amazon, Tesco, PC World, Game and so on. They will flag up the best bargains to be had from their stores to ramp up the excitement, and there may be something you'd like.

### Be on the alert

At the same time, set up a new, throwaway email address and sign up for email newsletters from the stores you reckon will be useful to you. Retailers are sending emails listing some of their discounts, and they're also promoting time-limited sales of some items. There may be a reason why they're promoting a certain product, though, so be keenly aware of that.

### Make a list

A bargain is only really a bargain if you actually want the item that is being offered to you in the first place. There's no point in going for that cheap 4K television if you had previously vowed not to get one because the HD set you already have is perfectly fine. That's just spending money for spending's sake. So earmark the stuff you really need but haven't got round to buying.

### Set a budget

Don't go way over what you can afford or what you want to pay for something just because it's on offer or is going for a price that, at first glance, seems too difficult to resist. Look at your bank account, check that credit card and think, 'Okay, what do I really want to spend and will I regret going well over?' Buyer's remorse is a slippery slope to eBay.

### Bookmark Black Friday pages

Some websites will have Black Friday pages already set up, so look for them and ensure they're in your bookmarks. Then open a few tabs on your browser and activate each site so you can keep an eye on any incoming cheap deals. Sure, it's a lot of work, but even if you save £100 or so on something you want, it could be worth the effort.

### Get up early

Don't dawdle. Whether you're intending to head down to the shops in person or go online, then you should try to get in as quick as you can. There may be queues if you hit the physical stores, but you're more likely to grab limited offers if you're the early worm. Some of the bigger ticket items will go fast, although online stores will tend to stagger their offers to keep the interest going.

### Keep your phone handy

If you're out and about, then have your phone with you. Do a quick check on an item just in case you can actually find it cheaper elsewhere, and have a scan at some reviews if you are unsure. You can use sites such as [camelcamelcamel.com](http://camelcamelcamel.com) to check price histories and there are lots of forums such as HotUKDeals and Moneysavingexpert.com, which can point you to the shops where there are bargains galore.

### Know what you're buying

As you'll know, manufacturers bring out various versions of their tech, and they also replace products on a regular basis. This means you'll want to double check that the item you are buying really is what you think it is. Is that laptop you're after the one with the processor you need and the right amount of RAM? Is the iPad the latest or an older, slower model.

### Check the cashback sites

It is very likely that you'll be able to get a little bit extra off your shopping if you go through a cashback site such as TopCashback and Quidco. You don't get the discount immediately but once a sale is successful, a sum of cash should end up sitting nicely in your account ready. Look for promo codes and vouchers as well for the maximum savings.

### Forget the warranties

For the most part, don't bother with the warranties that are being offered to you. They can be costly and in many cases they are not worth the outlay. According to [moneysavingexpert.com](http://moneysavingexpert.com), you are better off looking for multiple-item policies if you do want the peace of mind of a warranty, but remember that you still have consumer rights if you don't take one out. You can also tell a salesman that you will take a warranty if they discount further – then cancel it within 45 days.

opportunity to get some money off a nice piece of kit as long as you're savvy and only go for the items that you would have bought anyway. The key is knowing where to look and when and not going too mad in buying stuff you don't actually need. Where should you be looking, though?

Well, you may have already noticed that Amazon has spent the last week-and-a-half flogging an extended Black Friday, but there's a still good chance to grab a bargain from this particular online retailer. You may still be able to get the well-reviewed LG 43UH603V 43" 4K smart television for £399, down by £200, and you may well snatch up the superb

“ Cyber Monday in 2015 saw tills ring to the tune of £968 million ”

Amazon Echo, which normally sells for £149 but was, at launch for Prime customers, going for £100. Any replication of that and you should be 1-clicking like fury.



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Argos has also been cutting prices since 18th November, while Tesco began on the 21st. But it'll intensify tomorrow (again, as long as you're reading this on Thursday) so keep an eye out and you should be able to grab a bargain. After all, the usual stalwarts are getting involved including PC World, GAME, John Lewis, Debenhams and Selfridges and they have a lot of stock to shift. And just like in the UK, Black Friday is heralding the start of the Christmas shopping rush, so it'd be silly not to at least have a peek at the possibilities.

## Click, Click, Click

Last year, Black Friday saw £1.1 billion of sales, with revenue over the entire weekend topping £3.3 billion. That made it a mammoth success for retailers, and it was up 35% on the year before, ensuring the day became a big deal for UK stores. With that in mind, the Black Friday weekend this year will be chock full of more enticing deals than ever. But what sort of things should you be expecting this time around?

First of all, if you're hoping to make a beeline for the Apple stores, forget it. The company itself is unlikely to be slashing its prices. In actual fact, it recently raised the cost of buying its iMacs by more than £300, so bargains and Apple don't quite fit that well in the same sentence in these post-Brexit days. So

“ If you're hoping to make a beeline for the Apple stores, forget it. The company itself is unlikely to be slashing its prices ”

to get the discounts on Apple products, you need to head to retailers such as Currys, Argos and Amazon.

At the time of writing, Argos was flogging the 38mm stainless steel cased Apple Watch for £399, down from £479, and it has the iPad Air 2 128GB for £40 notes less at £469. These deals may have even got better so if you're in the market for either, take a look by going to Currys' special webpage: [goo.gl/JPUY1Q](http://goo.gl/JPUY1Q).

## Watch Out For The Sales Crash

The sheer volume of shoppers flocking to websites to snap up Black Friday bargains will inevitably cause problems. It has done in the past and we just know it will happen again (and we're not being pessimistic – consider how ticketing websites often collapse under the weight of demand even though the developers must be aware it could happen).

Tesco, Currys, GAME and Argos have suffered website crashes and while they get themselves up and running quickly enough, it can be very frustrating, particularly if it happens during the checkout process. There have also been issues of prices fluctuating from the moment you select an item to the time you go to pay. This means you have to be extra alert.

The positive to all of this, though, is that time-limited deals on many websites are set to be less common this time around. That way, the retailers are able to prevent bottlenecks with too many shoppers looking to grab the same item at the same time, producing serious outages. It is also the reason some are extending Black Friday over a few days, spreading the burden.

As you'd expect, when websites go down, Twitter is ablaze with frustration and threats of never shopping with a retailer ever again. Tempers can fray, but remember, it's not the end of the world, and the bargains will – and inevitably do – roll around at other times of the year during specific sales and end-of-line clearances.



Indeed, Currys, Argos and Amazon are good places for tech in general, as are John Lewis and Carphone Warehouse. In fact, you should snap up an Amazon Prime 30-day trial for free if you want to get your items delivered the next day, and this will also allow you to benefit from the online retailer's Lightning Deals. It's just a shame that you'll have missed out on getting Prime for £20 less (£59) since that short-lived offer ended on 18th November.

If you don't fancy Amazon, Tesco will be a good port of call. Last year, it seemed to promote technology deals very heavily, and there were examples of laptops that were down by as much as two thirds. Likewise, it was possible to great far cheaper mobile phones and headphones, including those





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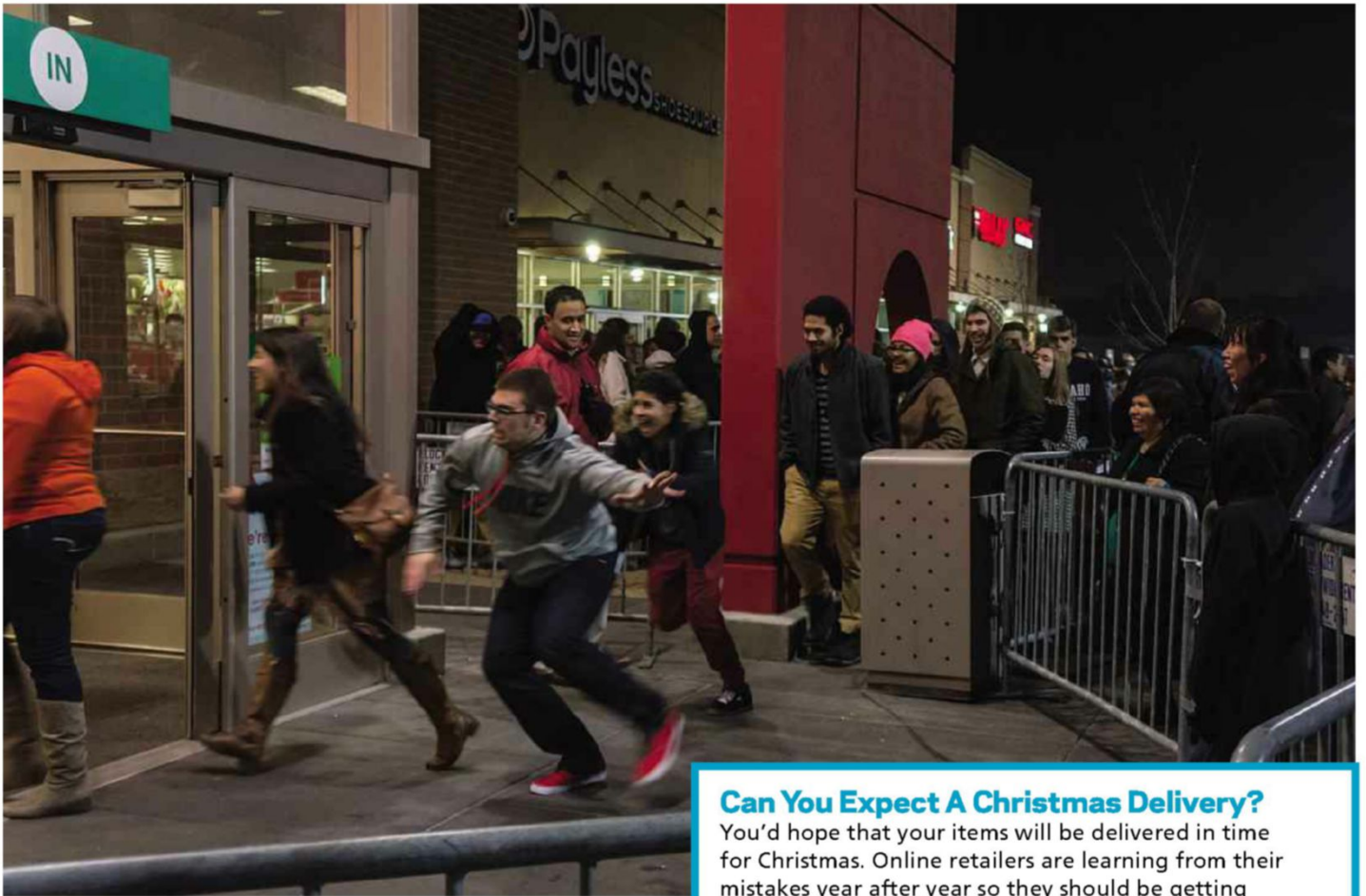
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made by top-end manufacturer Beats. There's no need to rush either because Tesco's deals are set to run until 1st December, and you can go straight to the potential bargains online without having to elbow your way around the stores by heading [goo.gl/I9SkVN](http://goo.gl/I9SkVN).

Likewise, Sainsbury's, which had Black Friday deals right up until the Sunday last year, looks set to do the same again.

## “ Tesco's deals are set to run until 1st December ”

Don't bother going to Asda, which pulled out of Black Friday last year and isn't taking part this time around but do think outside the box. It's worth having a good look at Toys 'R' Us, for instance; you may not want a Barbie doll or a Hornby train set (or maybe you do), but it's a great retailer for games, consoles and tablets. You may even be able to get some offbeat purchases a bit cheaper – perhaps a ChiP Robot Dog or a UBTECH Alpha 1S Humanoid. Just keep watching, and there will always be a chance something you really want will be coming up.

### A Second Chance

Don't worry if you completely miss Black Friday, though. Whether you've fallen ill on the big day, failed to see the fuss or simply got hold of this magazine after the weekend, there is

### Can You Expect A Christmas Delivery?

You'd hope that your items will be delivered in time for Christmas. Online retailers are learning from their mistakes year after year so they should be getting sharper. The delivery companies will also be making strong plans, taking on thousands of extra staff to cope with the annual increase in demand.

But there have been some mishaps. Last year, Argos suffered many customer complaints when deliveries were delayed or even cancelled, leading to lengthy waits on the phone to its call centre, all thanks to the increased numbers buying from the retailer on Black Friday. According to reports, there had been 18 orders every second, and 90% of them wanted Fast Track same-day delivery.

Common sense would tell you that unless there are firm contingency plans, this would be impossible without running the poor (and often poorly paid) delivery drivers off their feet. But when you've placed an order, there is an expectation that it will arrive, and it would be unforgivable if you buy something over the Black Friday/Cyber Monday weekend and the item misses a pre-Christmas delivery (unless of course, you're made aware of that before your order is placed).







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another way of getting hold of some bargains. It's called Cyber Monday, and it's set to take place on 28th November. What's more, if last year is anything to go by, it's set to be just as big as Black Friday. Cyber Monday in 2015 saw tills ring to the tune of £968 million – some £40 million more than expected. Will it top £1 billion this time around? We reckon so.

Cyber Monday originated in America in 2005 and it refers to the Monday after Thanksgiving. The extra day allows retailers another boost, and it really works. For that reason, some retailers will be holding back some of their most special offers for this day so don't max out your credit card completely beforehand, because you may find there's something you want on this day too. There's also another day called Green Tuesday, which directly follows the capitalist mayhem. It emphasises organic and environmentally friendly items and encourages

“ It can end up in fisticuffs, because Black Friday is also competitive ”

people to spend locally. Frustratingly, though, it's one that hasn't made it over to the UK yet.

But by then, you're probably going to be ready to flop under the sheer exhaustion of it all. Shopping with such intensity is not for the faint hearted. So why do we do it? Well, it may surprise you to learn that we may not be engaging in Black Friday purely to save some cash and bag a bargain. Troy Campbell, the assistant professor of marketing at the University of Oregon, says it is like a holiday, and he compares it to, say, the opening of a *Star Wars* film or the release of a new *Call of Duty* game.

In that sense, it's about community – of everyone going out together to shop and socialise. It can end up in fisticuffs, because Black Friday is also competitive. Some people thrive on the crowds and the sense that they can 'win' at this game of finding stuff at the cheapest possible price. Other experts sense that it is primal. Kate Nightingale, a customer psychologist, told the BBC last year that the sales worked on the basis of scarcity – of selling a limited number of items so that they seem more valuable (look at the scramble for the £50 new Nintendo NES consoles, which are changing hands for £130 or so on eBay for proof of that).

This is why some Black Friday deals are for limited times only and why you shouldn't hover too much if you really want something. The excitement when a bargain appears or when the doors to a store are flung open is too much for some, and they'll fill their trollies and online baskets. This causes problems of its own, though. The adrenaline and emotion of Black Friday could push you into buying something you don't want or need. There isn't any harm in walking away from something you're unsure of.

At the same time, don't be defeatist. By making sure you read our preparation checklist and by looking carefully at your budget, you can have a great Black Friday, a stunning Cyber Monday and still have more than enough festive cheer and money to see you through to a bumper Christmas and all of the fun, frolics and booze that brings. Why not let us know which bargains you managed to grab by heading to our forum? **mm**

## Price Matching On Black Friday

Whether or not you'll be able to price match on Black Friday depends on the store. We would expect John Lewis to do this, since it says it is never knowingly undersold, but this should also mean that the prices on its site will be at the same price as those on its competitor's website. If in doubt, check with customer services or the manager if you are in the store.

## Top Items To Look Out For

### Televisions

This is the perennial favourite and the one product many shoppers seem to lose their heads over. The ones to watch for are 4K sets with support for HDR.



### Gadgets

There are some great gadgets around. Keep track of the Amazon Echo, and monitor the prices of coffee machines (Nespresso tend to be good), drones, GoPros, Fitbits and tablets, all of which should see some price drops.



### Mobile phones

It's a good time to go shopping for smartphones. There may be good deals on iPhones and Samsung handsets but watch out for the brilliant OnePlus 3 too.



### Consoles

Now that the PS4 Pro and the Xbox One S are available, solid price drops on the PS4 and Xbox One are likely. Look out for cheaper games too. Some retailers may even discount pre-owned titles.



### Computers

Dell will be offering Black Friday discounts, so head to [dell.co.uk/blackfriday](http://dell.co.uk/blackfriday). Lenovo is slashing prices too, and there will be offers concerning Acer and Asus machines. HP offers Black Friday deals in the US so watch out in case they do the same here.





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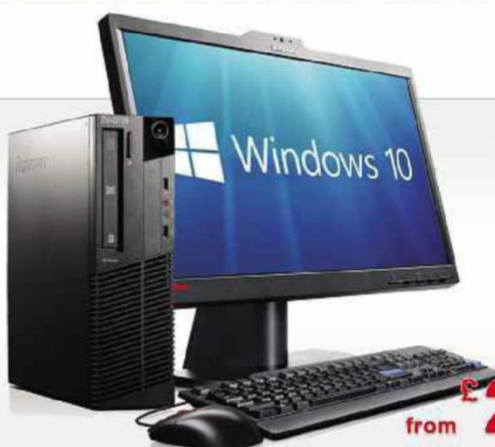
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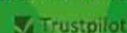
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# Illuminati PC

**Mark Pickavance installs some internal case lighting, enabling what's inside to be better viewed through the side window**

**E**arlier in the year, I built a new system around Intel's latest Skylake desktop processor. In my original plans, I'd have transferred my flag to this machine and left my Haswell-based workhorse to enjoy a well-earned retirement. But for at least five good reasons I haven't done that, and today I'm still typing furiously away on that machine.

One of those reasons was that the Skylake system wasn't fully finished, even if it ran acceptably as a computer system.

What I'm referring to is that this system was built into the excellent Corsair Carbide 400c case, and that has a large transparent door on it. However, without some sort of internal lighting, the inside remains just a small cave filled with expensive electronics.

In this article I'll talk about lighting up the PC to show off its internal features using a couple of new Corsair products. And I'll also talk about case lighting in general, and those things you should probably avoid doing.

Before I get into this project, let's cover some general advice about lighting a PC.

## Lights, Camera, Action!

Almost all computers have some light on them, even if it's just the LED that indicates the system is powered. Adding more is a relatively simple exercise, as we'll see shortly, especially if you have a case designed to present your hardware.

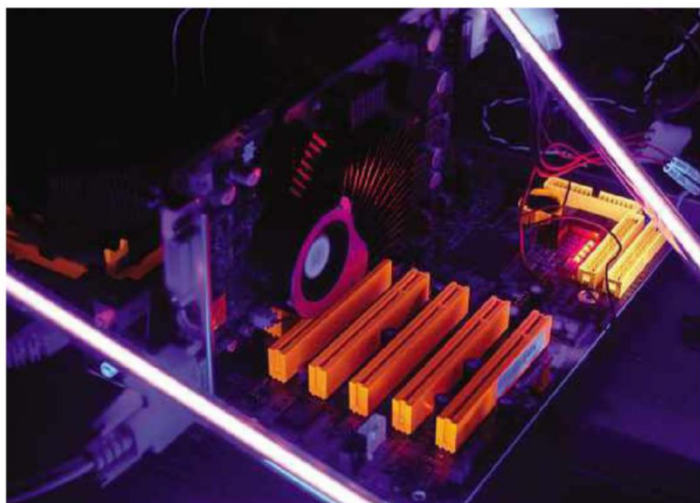
For those who set out to build an illuminated system, it's best to start out with the case, because some are really excellent for doing this with, and others just aren't.

The obvious designs to look for are those with a clear side door or other window panels that allow you visual access to the interior. For the makers among you, it's possible to take an entirely solid case and cut holes in it, especially if you've got a friend with a water/laser cutter or a very steady hand with a Dremel type tool.

What's important to realise is that if you don't fill these gaps with acrylic or something similar, it will impact the airflow through the case significantly.

Once you've chosen the case, then you need to think about how you intend to light it, because there are lots of options.





You can get lighting kits that consist of LED spots and bars, or illuminated fans, and you can also get motherboards and video cards with lighting on them.

One of the more interesting lighting builds I did a while back used a motherboard made by DFI LAN Party that had components on it that would fluoresce when exposed to ultra violet lights. To make this work required black light illumination, but the result was dramatic if a little 'disco'. If I repeated the exercise today, I might use paints that fluoresce and spray them onto the interior of the case.

Another technique I've seen used to good effect is to use a fluorescent dye in a water cooling system and clear pipes. This generates lots of light and also shows off the water cooling system very well.

These are all things you might try, but there are some things I'd really avoid. What's generally a very bad plan is to introduce mains lighting into the PC by mounting a bulb with external 240V power. There are two issues to doing this: having mains voltage inside the PC and the amount of heat a bulb can generate.

Electrically, everything beyond the PSU is at a much lower voltage than mains power, so bringing that inside the case would seem like a bad idea for numerous reasons.

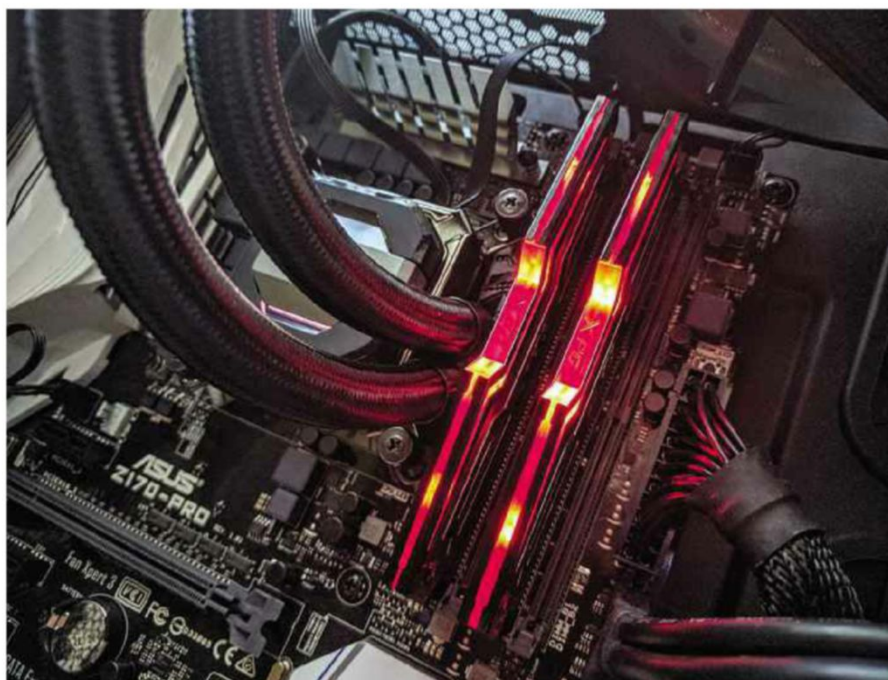
While you could use a low power LED bulb, most lighting designed to be on the ceiling or behind a lampshade will get exceptionally hot enclosed in a PC case. Whatever lighting you use by its very nature will tend to generate some heat, so consider adding a little extra air circulation to handle it if you haven't got plenty already.

The other advice I've got about case lighting is that subtle is much better than excessive. While something that looks like part of a travelling show might look great when you first build it, you might soon tire of it or the distracting movement.

Because of this, I'd advise anyone who has case lighting to consider adding a switch or control that allows you to disable it. Sometimes you might not want it flashing or whatever, and you can give it a rest in strong daylight.

If you intend to brighten up your PC in this fashion, I'd also consider getting some suitable accessories. These days, you can get amazing backlit keyboards, mice and even mouse mats, allowing you to extend your theme beyond the extents of the case.

Enough theory: let's modify an existing PC to make it look more interesting.







## The Workspace

For those unfamiliar with the Corsair Carbide 400C, this is an unusual design that features no 5.25" or 3.5" external bays whatsoever. That's an irritation if you like having optical drives mounted, but lovely if you've got limited space and want a full-size motherboard in a compact case.

As we can see from this image, most of the inside of mine is taken up with the motherboard, along with a water cooling system and the PSU.

For those wondering why I didn't mount the Corsair H110i GT into the ceiling of the case, there isn't enough room sadly. So instead I let it suck air from behind the front fascia and then have the issue of extracting it before it heats up the rest of the system.

The motherboard I've used is the excellent Asus Z170 Pro, and on it is a Skylake Core i5-6500 3.2GHz and 8GB of Crucial Ballistix DDR4 RAM.

While the Z170 board does have some white highlights on it, almost everything else in the case and the case itself is black.

The good aspects of this situation are that this case has a really superb cable management setup on the backside of the motherboard tray, and as you can see, there is plenty of room for excellent access on the public facing side.

The first thing to do is something about the RAM, because this make-over will need some memory that does more than just hold data.

## RAM Bling

Over the past few months I've reviewed a number of memory products that are for case illumination. And some of them are really quite spectacular.

The first I was sent was these incredible Avexir Raiden modules that appear to have a lightning storm trapped in them. The effect is quite stunning, though it's not that bright, and while the electricity moves around, there isn't any other variation. One issue with these modules is that at the time of review, they cost nearly £70 for two 4GB sticks. And I really need four of them. Four 8GB modules would cost north of £200, and I'm not sure the mad scientist theme is the look that I could ultimately live with. What I need is something less extreme and maybe a little cheaper.

The ADATA XPG Dazzle is a very nice kit that includes some illumination, and at £106 for two 8GB modules, they're more competitively priced per gigabyte. That still puts a quad set of these at more than £200, though you'd get 32GB of memory in that kit.

These look nice, though frankly I didn't want the colour RED, and that's what these come in exclusively. Instead, keeping with

the largely Corsair theme here, I decided to use some new DDR4 modules that they've just released: the Corsair Vengeance LED.

The exact spec of this kit varies depends on how much cash you've got to splash on them, the cheaper ones being these C15 3000MHz capable modules I used, or it does make some even more spectacular C16 3200MHz ones.

The exact modules I used were coded CMU32GX4M4C3000C15B. That's four 8GB modules with a 3000MHz clock, C15 timings and blue LEDs. You can get them in red, white and the blue, and obviously if you buy different packs of dual modules you could very nicely mix them up.

The downside to this choice is a cost of £234.99, though that's for 32GB of RAM – as much memory as this PC is every likely to have or practically need.

I went with the blue colour scheme, because I thought it worked better with the white plastic elements on the Asus Z170, though white might have also been fine.

Getting these to do their thing is purely a matter of plugging them in, obviously with the system turned off. They look rather swish, even if they don't crackle with electricity.

What this picture doesn't convey is that the LEDs on them aren't statically illuminated, the brightness cycles in a way that makes the PC seem somewhat alive. My only reservation about them is that you can't control this cycling action, and the modules aren't aware of each other, so how it does it appears a little random.

They are also rather tall, so they probably wouldn't be a good option if you have an air cooler that overhangs the memory slots. As memory, they're rather nice, being rated to PC4-24000 (3000MHz), with an SPD latency of 15-15-15-36 and





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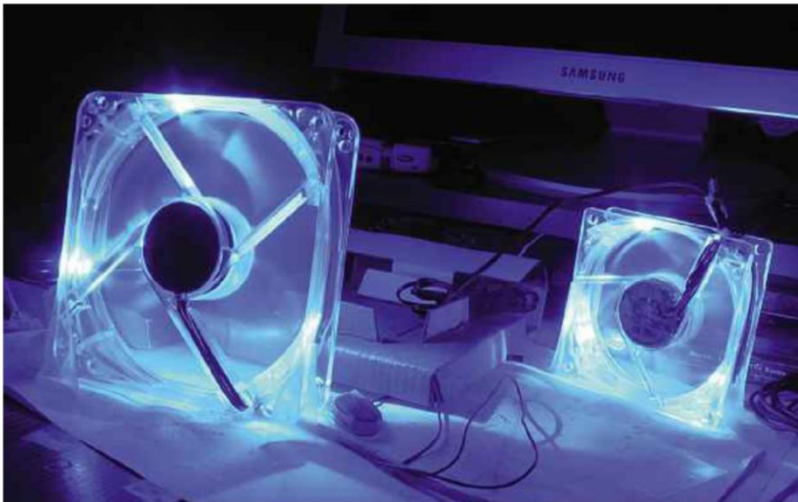
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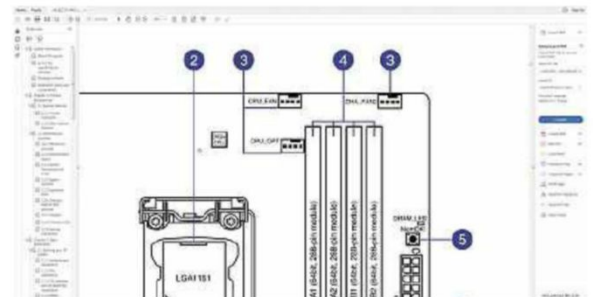




▲ Originally I wanted to mount these on the radiator, but that takes 160mm fans, and these are 120mm. So instead I replaced the rear fan and mounted the other two into the roof. From there they can cast light down across the motherboard and illuminate the case interior.



▲ Each fan has two cables coming from it: one that is designed to go to a standard four-pin fan header and another that's destined for the kit supplied fan controller. The cables are a decent length, but having so many wires running around the inside of the case isn't ideal.



▲ A quick look at my Asus Z170-PRO manual reminded me where all the fan headers are on this layout. Luckily there are three unused headers for me to give each fan its own. Without these, the fan can't get power, so they're a necessity. The alternative is you can get Molex or SATA power adapters to fan pins, but you won't have any speed control over them.



▲ A little controller box that comes with the kit, which as you can see is made to handle up to six fans. The connector and cable on the right is the one that goes to the mode selector box allowing you to set colour, speed and effects for all the fans. Hidden in this shot is also a wire that gets power but being attached to a SATA power connector.

1.2V voltage that can be upped to 1.35V when performing overclocking experiments. Once these went in the system, it started to look more interesting, but the amount of light that they produce isn't enough to illuminate much else.

Time to deploy some LED fans!

## Fan Lights

Illuminated fans have been around for a long time. I recall using them in an entirely acrylic-sided system I built for Micro Mart in 2003, and they weren't revolutionary then. Usually they're made of a transparent or translucent plastic and have LEDs embedded in the structure. A few of the better ones have a little controller built onto them so you can adjust the brightness or flash rate, but most are just lit when the PC is powered.

The fans I deployed were a number product, again by Corsair, the HD120 RGB. As the name suggests, the LEDs used in this product allow for a wider range of colour possibilities, along with moving the air around like you'd generally expect.

Here's the triple HD120 kit with the controller and accessories:

The price of the HD120 triple fan kit and controller is £68.44, at the time of writing, and that seems a pretty good deal, because a single fan costs £22.81, and one fan with the controller costs £38.02. Buying the three fan pack costs little more than three individual fans, effectively giving you the controller for free. Each controller can handle up to six fans, so there is some reasonable room provided for expansion.

Installation can be a little tricky depending on how well your case supports the hiding of wires, and that's something the Corsair Carbide does very well.





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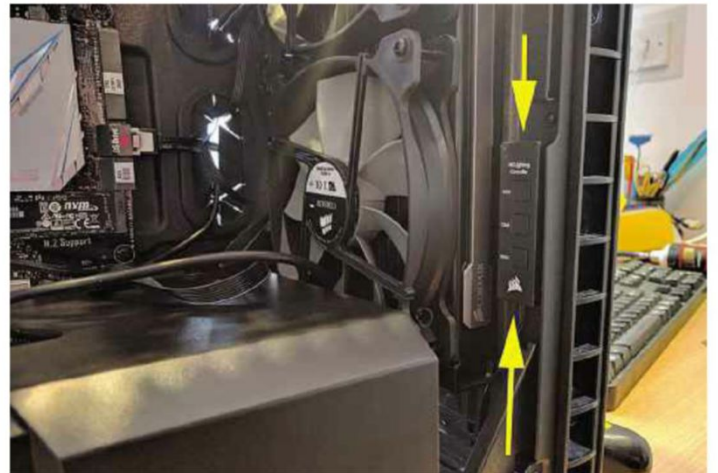
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▲ The problem with this installation presented in one image. I've got six cables coming from three fans to a controller, plus an interception of SATA power and all the other junk that's going on below the motherboard tray. As I didn't have a spare SATA power line, I was also forced to add another cable to the PSU's cabling system.



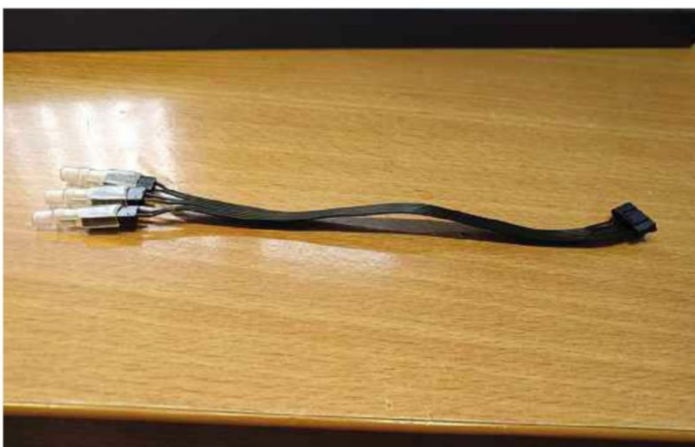
▲ I found a really nice location for the controller box at the front just behind the fascia. Being here I can just open the door and press some buttons if I want a change of scenery, or to demonstrate the possibilities. As this detaches from the controller box, it was easy to run, and it comes with adhesive pads underneath to secure it.



▲ Powering up the system for the first time, the fans default to white, though pushing the 'color' button on the controller soon altered that to one of a range of strong colours. At this point, I'd not gone in the BIOS and adjusted the speeds, but that's something I need to do at some point.



▲ The controller has three buttons that handle colour, mode and speed. Available colours include white, red, orange, yellow, green, blue and violet and it will also cycle all colours. There's a demo mode, static, breathing, flicker, sequential, marquee and a rainbow effect. Speed has just three levels: high, medium and low.



▲ For those who don't care for the standard controller, Corsair provides this handy cable that allows you to wire any buttons up to the electronics of the controller. That allows you to build the light control into your themed case with whatever custom switches you fancy adding. For modders that's a nice touch.



▲ While the controller is meant to switch all the fans at exactly the same time, occasionally, it seems to get them slightly out of sync. This isn't a huge problem, but it is something you need to be aware of. I didn't experiment with changing ports around to see if I could better control the slight delay, but that's a possibility.



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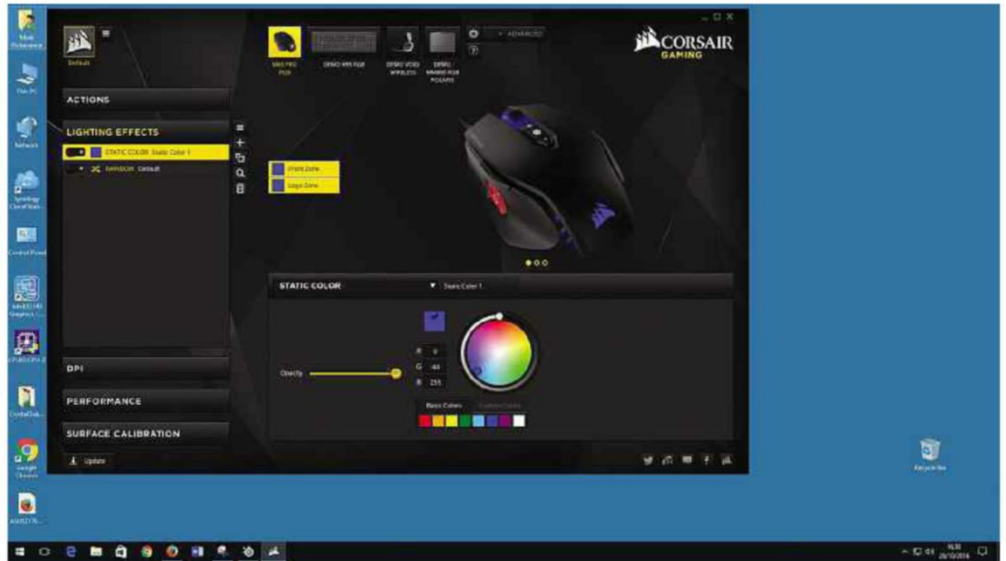
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▲ With the case now glowing, and all the wires neatly stowed I decided to dig out some suitable peripherals and adjust them to match. This is a Corsair M65 Pro RGB mouse, and I also have a SteelSeries Apex M500 backlit keyboard and some SteelSeries Siberia 350 headphones. The M500 is limited to blue LEDs, incidentally.



▲ Each peripheral has its own software controls to adjust colour, though both SteelSeries items use the same ENGINE3 application. One oddity I've noticed with this mouse is that it won't go to the blue I wanted unless the app is loaded, whereas the SteelSeries items store their settings on the device.



▲ As both the keyboard and the memory could only be blue, my initial thought was that I'd stick with that colour, even if for numerous reasons they weren't exactly the same colour. While the headphones and mice could be fine colour adjusted, the fans couldn't be, so this wasn't something I could really fix.



▲ Eventually I decided a two-colour motif looked much more interesting, and I played around with the fan colour to go with blue, and green looked very pleasing. I also tried violet, and that is also great. Red and blue isn't a good choice, though the orange and blue is a very striking option.

## After Thoughts

As much as I like what the HD120 RGB fans do, I think Corsair slightly dropped the ball with them in one respect. The hardwired controller is great, but if it had been connected to a USB header (where it could have got its power), then that would have really opened up the possibilities. Not only could the case lighting become app or activity dependent, but it would have allowed for customisable user definable lighting schemes.

I really hope that Corsair considers doing this in the future, because addressable LEDs on addressable fans could be remarkably cool for those who like to create high-end custom computers.

That said, the HD120 fans are really high quality, produce some lovely lighting effects, and most PC owners should be able to deploy them without much trouble. Having a case that has good cable management and a motherboard with lots of fan headers certainly helps in that respect. These products definitely

drove the shadows and gloom out of my system and added some much needed colour to my office too.

With nearly a £300 outlay, my PC does look much more interesting than it once did. However, you could easily achieve something similar for much less, and much of this cost was having 32GB of RAM that was largely overkill.

What the eagle-eyed among you might have also noticed is that at this time there isn't a video card in this computer, and many of those now come with their own lighting built into them.

The reason there isn't a discrete GPU in place is rather unexciting, I don't currently have a spare video card for this machine. My intention was to transfer my 960 GTX over to it when I finally dispense with my Haswell system, but until then it will remain uncluttered by such attractive hardware.

What I can say without fear of contradiction is that nobody is likely to look into my office and wonder if my PC is on or not since I did these upgrades. [mm](#)



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# Best new Christmas gadgets

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# GoPro: Bad Karma



**After becoming the gold standard for action photographers and drone capture, GoPro has hit a series of bumps no stabilisation system can smooth out**

Camera makers have been having a hard time of things in the last few years, mostly because of smartphone makers. The quality of phone cameras has almost killed the compact camera market entirely in a relatively short period.

But with the shrinking of the camera market one company managed so far to oppose those trends, GoPro.

Originally founded as Woodman Labs, Inc back in 2002 by Nicholas Woodman, these days the brand is now synonymous with action video. The story goes that Nicholas was frustrated by the cost of suitable camera equipment to film an action holiday he took in Australia, so he set about making his own camera to do the job.

The first GoPro cameras used 35mm film and exclusively took stills, with digital photography and video coming along with the Digital HERO released in 2006. However, this design only took 10-second video sequences, had no memory card slot and a maximum resolution of just 640×460.

Two years later, GoPro launched the Hero 3 model with a 3MP sensor and the ability to capture 512 × 384 video, at up to 30 metres underwater.

The appearance of these revolutionary action camera designs parallel tracked the growth of YouTube, where GoPro captured action shots became the standard for those who didn't have access to expensive professional hardware.

As the years went by, GoPro produced a wider range of cameras and successively increased the scope of its designs. Its

latest Hero5 waterproof cameras can capture 4K quality video at 30fps, can be controlled by voice and have built-in image stabilisation.

But while many still consider GoPro to be the leader in the action camera market, there have been signs that not all is well with the company.

## Bad Numbers

A headline figure for the company was that in 2015 the number of employees reached 1,500, with revenue of \$1.62 billion and an operating profit of \$36 million. That's only a profit to revenue ratio of 2%, highlighting the relatively small margins that GoPro operates under.

What started to concern stock holders even back then was that GoPro started to experience a rapid decline in earnings, and that started to hit the stock value.

The Q4 earnings report was especially shocking, because it detailed that in that quarter, revenues fell off a cliff compared to those from previous quarters and year on year.

Market analysts had predicted Q4 would see GoPro net \$512m in revenue, where it was only \$435m, a 15% drop. The stock value hit \$10.50, from nearly \$87 in 2014, and the board was forced to slash the workforce by 7% in response.

If 7% doesn't sound much, that's about 105 employees, roughly. However many GoPro actually let go, it wasn't enough to turn





▲ *The GoPro Karma was meant to send the company back into profit next year, but was withdrawn after just 16 days*

around the numbers, and the company continued to haemorrhage revenue at an accelerated pace.

The latest numbers make for stark reading, in what has become a litany of missed targets and below expectation results. The 2016 Q3 results released on November 3rd showed a 39% loss of sales, with just \$240.6m compared with more than \$400m the same quarter in 2015. The modest profit of last year became an \$83.4 million loss, and the stock value plummeted accordingly.

Market predictions hadn't been great, but GoPro even underperformed those numbers, and focus now moved to those products that the company said would turn things around in 2017.

"GoPro is now a seamless storytelling experience, and we're very happy with customer reception so far. Looking forward to 2017, we expect to return to profitability, driven by the strength of our new products, double digit revenue growth and annual operating expenses of approximately \$650 million," said founder and CEO Nicholas Woodman, who emphasised that "These are the best products we've ever made and consumer demand is strong."

It took just five days for that positivity to utterly vaporise.

## Bad Karma

With its traditional markets under threat from companies with lots of expertise for making complex electronics cheaply, GoPro decided to diversify into another market that's undergoing dramatic changes: the drones.

Rumours had persisted for some time that GoPro was interested in building its own drone for some time before it announced the GoPro Karma.

The leading in the market for semi-professional drones is DJI, and it had worked with GoPro to enable Hero series cameras to be gimbal-mounted on the DJI Phantom and Inspire drones.

When it was launched the DJI Phantom 4 in combination with the Hero4, it was considered to be the most affordable movie platform available, and lots of people wanting to create their own aerial photography bought them in combination.

On 16th of September, Woodman officially unveiled the GoPro Karma, a drone that would go into direct competition with previous partner DJI. Initially many people got very excited by this, me included, because on first inspection, the Karma had many very exciting features, and it came alongside the new HERO5 and HERO5 Session, which were also introduced at the same event.

In presenting this new direction for this company, Woodman outlined his vision to the launch attendees: "We're stoked to launch Karma and show how much more it is than a drone. Karma

packs Hollywood-calibre aerial, handheld and gear-mounted image stabilisation into a backpack for \$799. It's so easy to use, a beginner can have fun straight away."

The Karma featured a foldable design, self-contained controller that didn't require a phone or a tablet to use, took the HERO4 or new HERO5 cameras, and even had a detachable gimbal for handheld filming.

For those who already owned a HERO4 Black/Silver, it was also less expensive (£719), and the example videos that GoPro showed looked incredible. The appearance of the Karma was so unexpected for DJI that it moved up the release of its own new drone, the DJI Mavic Pro – something it would later come to regret.

After the initial excitement, the first GoPro Karmas started to be tested by drone experts, and then the problems began.

The first thing that most reviewers noticed was that once you got the Karma airborne, it wasn't as stable as the DJI drones and tended to wander around when it was supposedly hovering.

As this design has zero collision avoidance technology, you're forced to fly the drone all the time, which can become quite tiring and gives you less time to handle the camera.

It also had a tendency to put the camera at an odd angle to the horizon, and the software had no means to adjust that to square.

“ What really shocked many pundits was that the total recall of Karmas was only 2,500 units, underlining just how few had actually shipped ”

While some were critical of the build quality of the Karma, the relatively short battery life and control range, most of the worst comments were directed at the software.

Those who had previously flown the DJI Phantom 4 felt like the Karma was like stepping back in time, where there was no 'follow me' functionality, and many features that DJI customers expected weren't available.

Balancing the critical views, some people liked it, and many considered the video quality of the new HERO5 Black as exceptional. However, when DJI released its new Mavic Pro drone,







many of the reviews sided with the DJI product in preference. And there also appeared to be an issue with those who had ordered the Karma actually getting hold of theirs.

After initially promising to deliver the Karma in May, then October, those who ordered those in the US were informed that it would probably be November before their drone arrived.

Outside the US, a vague 2017 timescale was suggested, but GoPro didn't give any details about the production or supply issues that it had in actually delivering on its promises. And then November 8th came along, and while most in the world were focused on the greatest train wreck of American politics, GoPro quietly announced the following:

"GoPro is committed to providing our customers with great product experiences. To honour this commitment, we have recalled Karma until we resolve a performance issue related to a loss of power during operation. We plan to resume shipment of Karma once the issue is addressed."

Having drones that weigh over a kilogram suddenly falling from the sky at 35mph is a major liability issue, and quite clearly the engineering in this product failed to meet those standards.

At this time, those returning their drones will be offered a refund, not a replacement, and you can't currently order the product from GoPro.

What really shocked many pundits was that the total recall of Karma's was only 2,500 units, underlining just how few had actually shipped.

## Let's GoPro Around Again

This company has issues on a number of levels, not least that its commercial lunch is being eaten aggressively by a number of Chinese competitors. The most active of these is phone maker Xiaomi, which launched the Yi Action Camera in late 2015.

Initially shipping only in China, the Yi is now available through Amazon in the US and costs just \$89 for a camera that uses the Sony IMX206, 1/2.3", 16 megapixel sensor. While not 4K capable, it can do 1080p at 60fps, and the 155-degree wide angle lens has an F2.8 aperture.

Xiaomi has since launched the YI 4K Sports Action Camera that can do 4K, which costs just £237.99 in the UK. With the tight margins that I've previously mentioned, GoPro can't price match against Xiaomi and its ilk.

Sadly, its detour into the world of drones appears a complete fiasco. Not only did its product come to market much later than initially intended, when it did arrive it wasn't ready, and it's competing with a new DJI product that appears superior in almost every respect.

Back in May, a week before the Karma's first delay, Woodman was interviewed and asked if the drone would be late, and he said he didn't think so.

That six months later the product finally arrived and now has been withdrawn is telling about the communications channel from those designing and making these products and those supposedly in charge at GoPro.

This all puts the company in a precarious position, because at this time, GoPro can't even say if the Karma will be relaunched at some point or never fly again. And while the new HERO5 series cameras are generally getting positive reviews, action cameras can be bought more cheaply for those who aren't brand fans.

Where GoPro goes from here is problematic, as it seems unrealistic to expect a company with a valuation of around a billion dollars to keep losing money at this rate.

It may turn out that the best choice for Nicholas Woodman is to allow his company to become a brand of another business, as depressing a thought as that might be right now. [mm](#)



▲ The new GoPro HERO5 Black. A great camera that is being undercut by Chinese alternatives



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## WhatsApp Introduces Video Calls

FaceTime, Skype et al... it's coming for you

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# Daydream Believer A Reality For Google

### VR headset now in UK

Google's VR dreams continue, as its Daydream View virtual reality headset is now on sale here in the UK. The hardware, which will cost £69, is limited in that it's only compatible with the Google Pixel and Pixel XL, but you can buy the headset from Google Play, EE, or Carphone Warehouse.

The firm has said that "with Daydream View and a Daydream-ready phone like Pixel you'll be able to kick back in your personal cinema, explore new worlds and get in the game like never before".

Google has said that Daydream View is roughly a third lighter than other similar VR headsets and google's VR blog highlights a host of fun you can have with it, with content from partners such as Electronic Arts and Ubisoft, plus the likes of CNN and IMAX, while there is also a well-received app from YouTube that looks to really open up the opportunities for the platform.

A real step up from Google Cardboard, then, but we'll soon see if this finds itself under many trees come Christmas morning.

---

# Vive Upgrade In China

### Untethered experience now on offer

In other VR headset news, HTC has made available an untethered option for Chinese users, via an upgrade kit available to purchase via China's Vive online store. The wireless upgrade kit, which clips onto the headset and sends and receives wireless data to the connected PC, promises no compromise in quality.

While there are reportedly no plans for this option to be made available over here, you can always buy one from China and pay for the shipping on top. Clearly, completely wireless VR with the freedom to move around is where we'd all like the technology to get to so we hope this is successful.





WhatsApp has, rather sensibly, introduced video calling for all of its one billion-plus users, across Android, iOS and Windows devices. The blog post that announced the update was a little mawkish on the matter, though, writing of

how "There's no substitute for watching your grandchild take her first steps", but despite the sentimental message it makes perfect sense for the service to have made this move.

People requested it and now it's here, accessible via a small icon in the top right-hand corner of the app. Lovely.



Black Friday is back, and I for one am hugely excited about it... Is what I might say if it were actually true. To date, I can count the number of Black Friday deals I've taken up using the fingers of one hand. In fact, I can do it with no hands at all, because I've never bought anything in one of these big sales. Why? Because I simply haven't found any deals that appeal to me enough.

That's not to say there aren't some good savings about, but even a few hundred quid off isn't any use to me if the item still costs hundreds of pounds that I don't have. For me, then, it's about being sensible. Yes, I would like to have a huge TV, for example, but I don't really need one. Smaller purchases might be more tempting, but often the discounts are only a couple of quid, so I still prefer to buy things when I really need and can afford them.

On top of my natural stinginess, I've become increasingly wary of whether deals really are the bargains they're presented as. Yet despite all my misgivings, when the big day rolls round, I know I'll be watching Amazon, Tesco and so on – just in case...

*Anthony*

# Amazon's Music Unlimited Now In UK

[Streaming, on demand and over here](#)

Own an Amazon Echo? Then you might very well wish to sign up to Amazon's newly-launched Music Unlimited streaming service, now expanded to the UK.

Prime users will pay an additional £8 a month (or £79 a year) for the on-demand music service. However, for Echo or Echo Dot owners, that figure drops right down to £4 a month for a single device. Anyone who isn't a Prime subscriber or an Echo device owner will pay £10 a month if they want to sign up.

Amazon Music Unlimited, which is entirely separate to Amazon's Prime Music service, offers subscribers access to 40 million songs, though it's the voice control integration with Echo that perhaps warrants particular note. Users can ask the service to play specific artists' music, playlists or even find songs for you based on some lyrics

or your current mood. If you're at all interested in this, Echo owner or not, you can trial it for 30 days first to see if it suits you.

The streaming music market is getting a little crowded right now though, right?



# Meanwhile... On The Internet...

**W**ell, 2016 just keeps rolling right on, doesn't it? More great news came through for customers of Three Mobile last week, as reports began to circulate concerning a massive hack of its customer database that could apparently affect as many as millions of its customers. In an online statement ([tinyurl.com/MMnet41a](http://tinyurl.com/MMnet41a)), the company said that it was "aware of an attempted fraud issue regarding upgrade devices and [is] working with police and relevant authorities on the matter", before explaining that the purpose of the scam – which used "authorised logins" (i.e. legitimate employee passwords) to access its database – was to "steal high-end smartphones". This was done by targeting customers due for an upgrade, ordering new phones in their name, and intercepting the parcels ([tinyurl.com/MMnet41b](http://tinyurl.com/MMnet41b)). The company noted that this was part of "an increasing level of attempted handset fraud", that had been "been visible through higher levels of burglaries of retail stores and attempts to unlawfully intercept upgrade devices." It claims that as few as eight handsets had been obtained using the method outlined, though *The Telegraph* reported a source telling it that up to two-thirds of the Three customer database, around six million customers, could have had their details compromised ([tinyurl.com/MMnet41c](http://tinyurl.com/MMnet41c)). Three was keen to point out, though, that the systems accessed do not "include any customer payment, card information or bank account information", which is at least something we suppose.

Whether or not this was an inside job, or a social engineering scam to discover login credentials, remains to be seen. What is known, however, is that two men have already been arrested on computer misuse charges related to the case, one in Kent and one in Manchester, while another Manchester man has been charged with attempting to pervert the course of justice.

**T**hile we talking about mobile phone company hacks, those keeping an eye on the progress of the Talk Talk hack may have noticed that the 17-year-old charged with exploiting what the UK's former information commissioner, Christopher Graham, called an infosec "car crash" (see Q225: [tinyurl.com/MMnet41d](http://tinyurl.com/MMnet41d)), has pleaded guilty to the charges against him ([tinyurl.com/MMnet41e](http://tinyurl.com/MMnet41e)). Only 16 at the time, the defendant – who can't be named – claims he "didn't really think of the consequences at the time" and was "just showing off" when he got involved in this hack, and others. He is one of five teens among the six people arrested in connection with the breach in the UK (the other was 20), along with three of the company's India-based contractors ([tinyurl.com/MMnet41f](http://tinyurl.com/MMnet41f)) who are accused of breaching the company's security policies.

**S**ometimes the truth hurts, right? Well, the police of Bangor, Maine in the US care not for your hurt feelings. They care about you not getting yourself into trouble by doing things you'll regret for a webcam ([tinyurl.com/MMnet41g](http://tinyurl.com/MMnet41g)).

Presumably having received reports of a scam circulating among male residents of its town, it released some of the bluntest, most down to earth web safety information we've ever seen ([tinyurl.com/MMnet41h](http://tinyurl.com/MMnet41h)). The scam it sought to highlight involved receiving a friend request "from what appears to be a very attractive female," who, after a while "requests that you do things in front of the camera for 'her.'" only to blackmail the performer under threat of the footage of said unsavoury acts being shown to his friends – "you know, the real ones", as they mercilessly put it.

Keen to point out that they "do not have a repair kit for stupid mistakes", and that "Once it is out there, we can do nothing for you." Bangor's cops offer up a handy six-point plan to avoid getting in a bad situation should you be targeted ([tinyurl.com/MMnet41i](http://tinyurl.com/MMnet41i)). Upon receiving an unsolicited friend request of this type, it urges them to:

1. Go to the closest mirror.
2. Look at yourself.
3. Give yourself an honest review and realize that there is no reason in the world that an attractive lady from the Philippines wants to be your friend.
4. Return to the computer and delete the friend request.
5. Continue looking at lawnmowers, motorcycles, and jacked-up trucks that are for sale in your region of the country.
6. Realize that you just saved yourself from showing the world what no one really needs to see, and a whole lot of cash.

Harsh. So harsh... But probably fair. Words to live by, we think.

**I**f, as so many people around us seem to be right now, you're just getting on the Snapchat bandwagon, be prepared to be behind the curve again pretty soon. For, with news that the company behind the popular selfie-sharing service signalling its intention to make a public share offering very soon ([tinyurl.com/MMnet41j](http://tinyurl.com/MMnet41j)), you can guarantee that younger users will be deserting it in droves very soon, off in search of wherever their annoying Auntie isn't.

According to *Bloomberg*, which received word of the filing from a confidential source ([tinyurl.com/MMnet41k](http://tinyurl.com/MMnet41k)), the company is seeking to raise as much as \$4bn from the process, a target that would, the news service claims, value the company at \$25-35bn. We don't know how true it all is, but we do know that when something gets a price tag like that, people want to see a profit. and change usually comes with it.

## .AVWhy..?

**T**o paraphrase the inimitable Hal David, 'what the world needs now is a metric tonne of dancing Pikachu'... Just because Burt Baccarach would've found it harder to write a melody for, doesn't make the sentiment any less true. And here they are, performing a rare Pikachu parade outside of their native Japan ([tinyurl.com/MMnet41l](http://tinyurl.com/MMnet41l)). As a bonus, here they are again, in their native habitat (aka Yokohama, during the annual August parade this year ([tinyurl.com/MMnet41m](http://tinyurl.com/MMnet41m))).





## Caption Competition



"This place rocks!"

What did you make of issue 1439's caption pic. Let's take a look, shall we?

- **Boris:** "You can't hide from Donald Trump anywhere!"
- **JayCeeDee:** "NASA puts the latest Go Pro Rover through its paces."
- **JayCeeDee:** "And siiiiiiittttt..... and staaaaaayyyyyyyyyyy. Good boy!"
- **JayCeeDee:** "Please remember – responsible owners clean up after their pet."
- **Thomas Turnbull:** "Pokemon Go has finally got to the moon. You gotta get em all."
- **Darren LeWarne:** "Well, the dating site did say she was leggy."
- **Darren LeWarne:** "Well, the estate agent did say it had plenty of space."
- **Chris Greening:** "Robot: 'What's your favourite chewing gum?' Astronaut: 'Orbit.'"
- **Leigh Spriggs:** "When stag night pranks go too far..."
- **Ed Winslet:** "So I don't the director, I wanted a new role – something meteor."
- **Jon Mace:** "You haven't seen a Philae around here, have you?"
- **Tony Warren:** "Yeah, I've all kinds of famous people here, mate. Bruce Willis even tried to blow it up..."

Thanks to everyone who entered, especially John Pickford, who suggested "This place rocks!"

If you have a caption for the picture below, head to the 'Other Stuff' section of our forum ([forum.micromart.co.uk](http://forum.micromart.co.uk)), or email us via [editorial@micromart.co.uk](mailto:editorial@micromart.co.uk), remembering to add the issue number to the email subject line.



# Facebook Announces Deaths.... Incorrectly

**Fake memorial notices impact social networking service**

**R**eports of Mark Zuckerberg's death have been greatly exaggerated. Even though those reports came from Facebook itself. Yes, the service issued erroneous memorial notices for its CEO and a host of other users of its service, which took the form of remembrance banners posted on their profile pages. For Mr Zuckerberg, the banner read, "We hope people who love Mark will find comfort in the things others share to remember and celebrate his life". Ooops.

Those affected by this error took to the likes of Twitter to okay after all, while a spokesperson for Facebook was quoted in the press as saying "This was a terrible error that we have now fixed. We are very sorry that this happened". Well quite.



# High Street Struggles

**Frustrations push people online**

**B**lack Friday came and went for another year and the high street is struggling to keep up with consumers' expectations, according to research from Barclaycard.

Its study showed that nearly four-in-ten consumers are choosing to buy online more frequently because of a demand for faster service and flexibility. Shoppers are also citing issues such as lack of time, crowded retail stores and checkout

queues as reasons for moving away from the high street, as two-thirds of those asked in the study admitted to abandoning an in-store purchase because of the various issues listed above.

Where does this leave high street retailers? The study has written that retailers need to bring their in-store and online offerings closer together, with services like Click and Collect, stock-checking touchscreens, and 'scan and buy' apps providing new opportunities.

## Snippets!

### SMB Ransomware

Kaspersky Lab has reported that small businesses were threatened by eight times more ransomware attacks in the third quarter of the year than during the same quarter last year. The firm's Small Office Security package repelled over 27,000 attempts to block access to corporate data in the third quarter, after which a Kaspersky spokesperson warned that paying the ransom doesn't guarantee the safe return of data and encouraged companies to use up-to-date security software.

### FIFA Fraud In US

A man in the States has been charged in court with Conspiracy to Commit Wire Fraud, relating to allegations of stealing and reselling in-game currency for FIFA's footy game. Anthony Clark is accused of playing a role in a criminal scheme to generate and re-sell digital currency within the Ultimate Team part of the game with four people reported to be involved in this little scam. The gang apparently used an app to trick EA servers into coughing up currency for thousands of matches which it fraudulently said had been completed. They then re-sold these coins on the black market to ultimately line the gang's pockets with millions of dollars.

### Web Bullying Increase

NSPCC counselling service, Childline, has noted an 88% increase in the number of children and young people needing counselling about online bullying in the past five years. It says it counselled over 4,500 children about cyber-bullying in the last year, compared with around 2,400 in 2011-2012, with the service giving examples of kids as young as seven contacting them. The charity's report points to the impact of comments left on social media profiles and blogs and Childline president Dame Esther Rantzen said that schools must take this problem seriously.

# Amazon To Refund Parents

## In-app purchases decision from States

**A**mazon has been ordered by a US judge to refund children's parents who made in-app purchases on Kindle and Android hardware between 2011 and 2014. Crucially, though, those purchases were made without parental consent.

The Seattle-based judge made the call for refunds to begin being paid out over a 12-month period from January 2017, and while we don't know the full figure involved, we do know that it's less than the Federal Trade Commission's call for a lump-sum refund of £20m as this was rejected as being "too high", according to Reuters' report.

Amazon has been told that it cannot offer refunds in the form of gift cards either, and it should start notifying parents who are eligible for a payout across the pond next year. A bit of a win for mums and dads who are a little cross over the state of mobile and apps, and games and how easy it is to rack-up in-app spending.

amazon.com™

# Samsung Apologises For Note 7. Again

## Full-size advert hammers home how sorry it is

**W**e're not sure that this was entirely necessary, but the Samsung apologies keep on coming in regard to its famously-faulty Galaxy Note 7 smartphone. As if a global recall and several statements on the matter weren't enough, now the company has placed a full-page advertisement in several US newspaper to apologise for the device's problems. The apology, signed by the firm's North America chief exec, wrote: "We will re-examine every aspect of the device, including all hardware, software,

manufacturing and the overall battery structure. We will move as quickly as possible, but will take the time needed to get the right answers."

The apology additionally goes beyond simply the Note 7 phone, though, with Samsung also acknowledging ongoing issues with some of its washing machines. Samsung has offered a recall on affected models and is also offering free in-home repairs and refunds. 2016 hasn't been a great year for so many reasons, and Samsung will surely be glad to see the back of it.





# Spain Wants To Ban Memes Erm, okay

**S**pain's Popular Party wants to place a ban on Internet memes. Seriously; the country's Prime Minister has proposed a slice of legislation that will make it illegal to spread 'images that infringe the honour of a person'. The result could be that many Internet memes would effectively be against the law.

It seems quite likely that this is a reaction to disparaging

memes of the Prime Minister himself that have circulated on the web, and thus Spanish social media has reacted to the proposal news with a great deal of scorn and the hashtag #SinMemesNoHayDemocracia, which translates as "no democracy without memes". Thus, all too predictably – and in accordance with the Streisand Effect – many more memes have also been doing the rounds since this news broke.

# Man Takes Selfie; Wrecks History

## Statue destroyed by museum tourist

**O**h dear. We can only imagine how sick a poor chap felt after suffering the most horrendous of accidents while visiting Lisbon's National Museum of Ancient Art in Portugal. The tourist took a selfie while walking around, which is a very common thing these days. However, this time the man ended up accidentally

bumping into a statue of Saint Michael which dated as far back as the 1700s. A worker at the museum posted a photograph of the damage on Facebook – and, as the statue cannot be repaired, this was a potentially very expensive mistake from the tourist as it's quite possible that he could be charged with the destruction of public property. Poor bloke.

# Emails Break NHS

## The perils of Reply All

**T**ales of emails sent in error are the stuff of water-cooler legend, but it's unlikely that this one will raise many laughs within the NHS. According to reports, an employee sent out a message on the morning of November 14th, and accidentally copied in over 800,000 NHS staff. As if that wasn't bad enough, other employees made things a whole lot worse by hitting Reply All to discuss the original message. You can probably guess what happened next: the system was blocked up and NHS staff couldn't contact each other.

*The Guardian* reported that one statistician estimated that some 186m emails were sent in total during the 'incident', as it will quite possibly be referred to by NHS IT support in years to come. While it all may seem like a bit of a hoot, crashing the NHS email system had some nasty side-effects: staff were reported as being angry and concerned that this could potentially impact vital communications regarding patients. NHS Digital hasn't named and shamed the worker responsible for the original error, although it sounds as though a whole lot of people were to blame over this one.

## Kolink Aviator V

The Aviator flies in to Kevin's view

### DETAILS

- Price: 46.99
- Manufacturer: Kolink
- Website: [www.overclockers.co.uk](http://www.overclockers.co.uk)
- Requirements: A love of lights (and a name of flight)



**B**land and boring cases aren't for everyone. Sure they may be functional, but where's the interest, the joy? This is the sort of question a speaking Kolink Aviator V might ask. A mid-tower PC case that has a little something more than your everyday cases.

Actually there are a few differences, but on the unboxing the most obvious one is the slightly aerodynamic aesthetic. Moulded cutaways and curves are emphasised in a gloss black on the front and top panels. Both are pitched toward the centre, with the front panel

featuring a click-to-open door perfect for those who like to tuck away DVD drives and the like. On the top, the power button is accompanied by two USB 3.0 ports, 1x USB 2.0 and a standard mic and audio jack. These form up opposite a reset button, two fan control buttons and an built-in card reader. Those last two details are far from standard inclusions, especially on this budget. But that's the story of the Aviator V.

While the right-hand panel is a matte black, the left is a darkened acrylic held in place by rubber-buffered screws. With a system in place, any illumination and hardware can... sort of be seen through this panel. Not that the view is clear; Kolink seemingly prefers the intrigue of a few caught glimpses. Given the reflection the panel gives off in well-lit rooms, glances may prove few indeed. Still, the acrylic panel does reinforce the overall style of the case and adds a little intrigue to what can be a fairly dry product category under fifty pounds. The metal mesh covering the top vent is equally true to the style of the Aviator V, proving Kolink is nothing if not committed.

Inside there are few frills and given the interesting inclusions on the exterior, it's clear that a £46.99 selling price can only stretch so far. Nothing is amiss though and a careful and tidy system builder shouldn't face any real issues. Three 3.5" drives and one 2.5" drive can fit neatly and although there's little options for cable routes, this may prove the only real issue for many. The Aviator V provides ample room for giant graphics cards and although the PCI plates are

(sadly) the snap-off variety, three replacements are thoughtfully included. This consideration certainly gets marks in my book!

For cooling, options tend to be limited with cases of this size, but the Aviator does at least deliver the standard rear 120mm exhaust with space to fit. Some may find a little trickiness in fitting an Intel cooler plate on the rear of a motherboard but, as is the case throughout the interior, 'snug' just requires added care and a bit more time and patience.

The final flourish? The Aviator V's two red LED-laden 120mm fans concealed behind the glossy black front. When up and running a rather cool, red hue illuminates and shows exactly why this case seems to be (ahem) flying onto many home-builder's parts lists. Sad to say this case's glossy panels does detract a little in attracting some marks. However, I'm sure any owner of this case would pride themselves on keeping it clean. If they did, they'd certainly have a rather attractive, well kitted out and very affordable system housing on their hands. A different but slightly daring home for all but the more demanding of systems.

**mm Kevin Pocock**

### Specifications

Model: Aviator black.  
 Type: Midi tower case.  
 Colour: black with glossy front panel finish.  
 Case material: 0.5mm steel/plastic.  
 Power supply orientation: Bottom.  
 Motherboard support: ATX/micro-ATX/mini-ITX.  
 External 5.25" bays: 2.  
 External 3.5" bays: 1.  
 Internal 3.5" bays: 2.  
 Internal 2.5" bays: 1.  
 Expansion slots: 7.  
 Front Ports: 2 x USB3.0 (with USB2.0 convertor), 1 x USB2.0, HD-Audio x 1, mic x 1, SD card reader, fan controller.  
 Cooling system: Front – 2 x 120mm fan (included red led), rear – 1 x 120mm (included), top – 2 x 120mm (optional).  
 Dimensions: 400 x 211 x 480mm.  
 Box dimensions: 578 x 263 x 538.  
 Clearance: VGA – 370mm, CPU Cooler – 170mm.

**Need 'different', on a budget? Here it is**





# Lexar Professional 633x microSDXC UHS-1 256GB

A little bit extra flash storage for the weekend, Sir?

## DETAILS

- Price: £223.99
- Manufacturer: Lexar (Micron)
- Website: [www.lexar.com](http://www.lexar.com)
- Requirements: Device that can accept UHS-1 specification micro-SDxCs

There is something slightly bizarre about offering a micro-SD card module with 633x speed capability. Because realistically most micro-SD card slots are wired to their devices internal electronics using USB 2.0 technology, the top speed of which is about 30MB/s.

There are some exceptions to this, but for the majority of users this module won't be any better at the capture end of the equation, because their devices aren't built to write their data any faster than a Class 10 module generally operates.

However, where this product is certainly useful is when you've used it to capture images or video potentially and you then want to transfer that data to a PC or Mac to complete the process there.

For this to be enhanced, you'll need a USB 3.0 capable port, and then you'll see



transfer speeds at the 95MB/s (633x) quoted levels.

Under my testing, it managed a not unimpressive 91.5Mbps reads and 83.56Mbps writes, well within the tolerance for this type of benchmarking deviation.

At this speed, the whole 256GB capacity will be disgorged in about 45 minutes or less, depending on the number and size of the files stored on it.

If that sounds like an overly long time, then that's half what Kingston's microSDXC UHS-1 module would take. But if you really want to cut that time down you might want to consider Lexar's 1800x UHS-II cards that can triple these speeds. Unfortunately, the biggest 1800x card it makes at this time is 128GB, so these 633x cards definitely have their uses.

Overall capacity is a strong part of this product's repertoire, because the modules come in 16, 32, 64,

128, 200 and 256GB capacities.

For those engaged in capturing 4K video, the extra space is most certainly an advantage, as long as their system is designed to use at least backward compatible SDXC modules and the 256GB capacity.

Where this won't work is with devices built for SD or SDHC cards, as they're only designed to handle 32GB cards. In theory, SDXC can go up to 2TB, though 256GB is the largest you'll see at the moment.

The problem here is the headline cost, because £223.99 is almost three times what the 200GB version of this drive costs or a £135 bounce for the extra 56GB space on here.

A Lexar representative did point out that these are RRP quoted price, which like the Pirate Code are more guidelines than actual rules.

I really hope so, because the realistic price for this module,

even considering it includes a USB 3.0 card reader, should be about half this price.

For those who can accept full size SD cards in their devices, the identically specified 256GB SDXC option can be found for £89. If you like the speed but don't need the massive size here, the 32GB version is about a tenner.

The quality of the product is undeniable, so let's hope it drops in price soon.

**mm Mark Pickavance**

**A massive micro-SDXC capacity but at a steep price**

CrystalDiskMark 5.0.2 x64			
File Settings Theme Help Language			
All	5	1GB	E: 0% (0/238GB)
	Read [MB/s]	Write [MB/s]	
Seq	91.50	83.56	
4K	6.646	0.835	
Seq	90.40	86.19	
4K	6.341	0.733	



# Venturer EliteWin S 11K

Venturer revisits its 2-in-1 EliteWin notebook

## DETAILS

- Price: £249.99
- Manufacturer: Venturer
- Website: [goo.gl/yaGs8M](http://goo.gl/yaGs8M)
- Requirements: Wireless broadband

**A**lmost a year ago I covered Venturer's BravoWin 10K 2-in-1. And with two extra models added to its range, it's now sent me its new EliteWin S 11K.

On the face of it, this new model is almost identical to the original EliteWin 11K design, but on paper at least there are few major differences between it and the previous model.

Like the first EliteWin 11K this system is still built around an 11.6" 1366 x 768 multi-point capacitive touchscreen, and it comes with 2GB of RAM and 32GB of flash storage. The processor driving it is the nearly three-year-old Intel Z3735F Atom, with a base clock of 1.33GHz and a burst frequency of 1.83GHz.

With this sort of power under the hood, this isn't hardware you'll be doing much gaming on unless your skills only extend to card games or the odd *Angry Birds* adventure.

The improvements it did make are generally subtle given that Venturer has had a whole year to deliver them.

Earlier machines required you to go and get your own micro-SD card for extended storage; now Venturer includes a 64GB module, giving you a total of 96GB from the outset. Or it would if the pre-installed

operating system hadn't already grabbed half of the base 32GB.

A really obvious upgrade that it didn't make was the wi-fi: the new S model still uses the same 802.11b/g/n electronics, with no support for 802.11ac included.

Another enhancement possibility was also passed in respect of the cameras, both of which remain bargain basement 2MP sensors.

Where the real alterations have occurred is in the construction and general robustness of the design, as this is certainly built to a higher quality than its predecessor.

The outer edge has a bevel that's very reminiscent of the original Microsoft Surface, and the gun metal scheme has very much the same vibe.

However, a closer inspection reveals some truly odd choices



# VENTURER





in regard to the tablet and its associated magnetically attached keyboard.

With the assembly closed, there are odd gaps around the edge like the two were never meant to be together. The reason I eventually deducted for these is that while the keyboard is logically flat, the tablet part of the EliteWin S 11K is very slightly curved in both the horizontal and vertical planes.

Why Venturer did this, I'm not sure, because it doesn't contribute to the user experience in any way this reviewer could detect or make it easier to stand up when detached from the keyboard.

The logical solution would have been a kickstand, though I accept the engineering problems in

“ Even a free subscription to Office 365 can't make up for the many mistakes ”

making one that folded into a curved surface.

The keyboard itself is a mixed blessing, in that it combines an acceptable membrane keyboard with a tiny touchpad and nasty 'virtual' mouse buttons. The latter I really didn't like, as getting properties on any icon seemed a largely random exercise.

The keyboard doesn't contribute more than that title suggests, it doesn't contain any extra battery, and it won't work when it's detached.

This makes the EliteWin S 11K very much like so many other 2-in-1 Windows machines, where all the weight is in the screen portion, making the system noticeably top heavy and inclined to fall over. The only reason it doesn't is that Venturer limited the angle at which you can recline the screen to about 20 degrees to the vertical.

I also wasn't impressed that it found room for a Windows button, mini-HDMI out, headphone jack and micro-SD

card slot along one edge, yet only one full-size USB port.

Confusingly, it included a micro-USB port, ostensibly for charging, though the included power pack doesn't use it, and it won't double as an ordinary USB port even with an adapter.

Probably the best part of this design is the screen. It isn't very well saturated from a colour perspective, but it's at least clear and has decent viewing angles.

Even a free month subscription to Office 365 can't make up for the many mistakes made with the EliteWin S 11K. But the biggest issue here is that Microsoft has failed to make Windows the tablet OS of choice in the four years since Windows 8 first appeared.

If you want a decent notebook, then get the HP Stream 13 for £70 less, and if you want a tablet then go Apple or Android.

**mm Mark Pickavance**

**A low power Windows tablet with a detachable keyboard**



# AOC U2777PQU

AOC puts quality as the top priority in the stunning U2777PQU

## DETAILS

- Price: £519
- Manufacturer: AOC
- Website: [aoc-europe.com/](http://aoc-europe.com/)
- Requirements: System with DisplayPort, HDMI, DVI or VGA

**Y**ou can buy a 4K TV for £200, if you're willing to accept some major limitations, but

realistically would you use this as a monitor? The apparent similarity between TVs and monitors in the technology does lead many people to wonder if the extra for a monitor is worth the extra?

The best answer I've seen is the AOC U2777PQU, because this isn't a TV and does things that a TV never realistically could unless it cost considerably more.

Technically, there are two versions of this screen. AOC makes the U3277PWQU, a 32" variant with an AMVA panel, and the 27" U2777PQU



## U2777PQU Specifications

Line: Pro-line.

Panel Type: IPS.

Panel size: 27" / 68.6 Cm.

Maximum resolution: 3840x2160@60Hz.

Aspect ratio: 16:9.

Scanning frequency: 30~160KHz / 23~ 80Hz.

Pixel frequency: 170 MHz.

Brightness: 350 cd/m².

Contrast ratio dynamic: 80M:1.

Contrast ratio static: 1000:1.

Pixel pitch(H) (V): 0.1554.

Display area (H x V): 596.74 mm x 335.66 mm.

Viewing angle (CR >= 10): 178/178.

Response time: 4ms GTG.

Colour: Black/silver.

Inputs: D-Sub, DVI, HDMI, MHL, DisplayPort.

reviewed here with an enhanced IPS panel technology. They're both built to generate 100% of the sRGB colour gamut range, though the U3277PWQU panel also claims to cover 95% of NTSC, the American TV standard.

As that strongly suggests, the target audience for these screens are those working in the media and video editing business and who like their colour calibration accurate.

The native resolution is 3840 x 2160 pixels (2160p) and the aspect ratio is the de facto 16:9, so nothing extraordinary there.

On unboxing U2777PQU for the first time, I was initially struck by how relatively heavy it is, compared with other 4K UHD screens I've handled recently.

Weighing in at 7.3kg with its removable stand, I expected most of that mass to be in the support, but it isn't. Only 2.1kg is the stand and the majority of weight is in the substantially built monitor.

The stand is interesting in a number of ways, not least that it allows a very wide range of movement and rotation. But it also doesn't connect using a proprietary





connection, just a VESA 100 panel with provided screws.

This means that should you mount the screen on a wall or pillar mount the stand could be reused by any screen with a VESA 100 holes in it.

The stand offers a vertical travel of 18cm, and the panel

can be spun through 165° and tilted 4° and back 24° from the vertical.

Displays that flip in this manner are useful for working on page layouts or websites, though only if the panel handles alternative viewing angles well. The AOC

U2777PQU has no problem in this respect, because its viewing angle is 178° in both axes.

What slightly confuses me about the AOC U2777PQU is the input selection, because it's not exactly screaming 'graphics designer'.

The four inputs that AOC gave this panel are DisplayPort, HDMI, DVI and VGA. Seriously, why add VGA and not another DisplayPort?

What's important to realise is that you can only get the full resolution and 60Hz refresh on DisplayPort or HDMI 2.0. On most Intel-based systems using integrated GPU, you'll be limited to either a lower resolution or 30Hz, and that makes the pointer noticeably lag on such a high resolution display.

Those wanting to play games on this display will probably need to use DisplayPort, and they'll need a really meaty video card. My Zotac GTX 960 was borderline playable on most 3D titles, suggesting that perhaps a GTX 1060 or AMD equivalent is a minimum requirement for gaming as 4K res.

Therefore, when you consider what you've probably spent on your system already, the £519 that this costs probably won't faze you.

AOC also put a really good USB 3.0 hub in the panel, enabling you to tidy up your cabling and use the screen as the means to connect your mouse and keyboard.

There aren't any speakers, though a headphone jack and audio line-out are included, along with cables for audio, USB, HDMI, VGA and DisplayPort. Being IPS, the response level of the

U2777PQU is good for an IPS panel, though not the TN level that hardened gamers demand.

For general use, displays like the U2777PQU do tend to point out the well-documented limitations of Windows in respect of very high resolution displays. On Windows 7, the interface seems painfully small, with desktop icons being only about 6 mm high.

Windows 10 has a scalability function that goes wrong as much as it works correctly, putting some apps in one scale and others in entirely another. Owning such a lovely monitor as this is, you'd be inclined to find workarounds and fixes, but it's not an ideal scenario.

Putting aside the vagaries of Windows, the U2777PQU is exceptionally well built and specified. The price isn't cheap, but you're probably getting what you're paying for in terms of colour accuracy and image stability.

Because of scalability issues, most people might prefer the bigger U3277PWQU option, particularly if they're not the ones paying.

**mm Mark Pickavance**

**4K monitor for those with few budget limitations**



# Fnatic Duel TMA-2 Modular Headset

We take a look at a professional, high-quality audio setup

## DETAILS

- Price: £189
- Manufacturer: Fnatic Gear
- Website: [goo.gl/mxhY3N](http://goo.gl/mxhY3N)
- Requirements: Available 3.5mm mic and line-in port

Continuing the Fnatic Gear brand, the company has recently launched a modular headset that's designed for both gaming and everyday use.

Working in collaboration with audio design company AIAIAI, the Fnatic Duel TMA-2 is a sleek, professional product that not only looks amazing but is quite a unique concept.

Fnatic prides itself on presentation, and on opening the TMA-2 headset box, you can see why. Once the vinyl covering, soft felt pouch and quick start guides are removed, you come across each element of the TMA-2 vacuum sealed in its own plastic bag.

Within you get two speaker units, the headband, two on-ear cups, two over-ear cups, a microphone, in-line microphone cable and mic splitter cable. It doesn't take a genius to assemble the parts; you simply choose which ear cup you want to use (over-ear for gaming or on-ear for an on the road configuration), line up the red coloured port on one of the speaker unit to the similar coloured audio jack that's hard wired into the headband, and plug it in. Once you've slipped the opposite speaker unit through the headband, connected the



▲ The Fnatic Duel TMA-2 is an excellent, high quality headset



▲ The modular concept is certainly unique

microphone and the mic splitter cable, you're ready to go.

Likewise,, you can easily swap out the ear cup types, ditch the microphone and plug in the in-line cable to hook up to a mobile device, for example. It may sound a bit long-winded, but the TMA-2 is designed to allow easy swapping of setups within ten seconds or less.

In terms of audio quality, the 40mm neodymium and titanium-covered speaker units deliver a rich, powerful and surprisingly bassy sound. Speech, mid and higher tones are remarkably clear; you could quite literally hear a pin drop in the middle of a battlefield. This high degree of clarity allows you to pinpoint the exact whereabouts of any enemies

in-game, and from a non-gaming standpoint, you get some marvellous details in the pickup of individual instruments across an entire orchestra.

The all-black, soft finish toughened headband, cups and speaker units look and feel superbly built – surprisingly lightweight too, at just 275g. The quality presented from opening the box thankfully continues through to the actual product, and the headset's uniqueness is actually useful rather than being a talking point or sales gimmick.

As is evident with everything mentioned so far, the TMA-2 is a high-end product, and it costs somewhat more than a standard headset. Priced at £189, you could be forgiven for taking a sharp intake of breath. However, keep in mind the modular design and, most importantly of all, the high level of audio quality.

In short, expensive it may be, but the Fnatic Duel TMA-2 Modular Headset is a great product.

**mm David Hayward**

**A superb headset, but rather expensive**





# Juice Nano Bar Speaker

Audio on the go has never sounded this good

## DETAILS

- Price: £26.99
- Manufacturer: Juice
- Website: [goo.gl/yBvgTf](http://goo.gl/yBvgTf)
- Requirements: Bluetooth, NFC or aux audio out compatible

Juice is a relatively new company formed under the Gusto name, which was born just four years ago. The company centres on developing products for the mobile world, device peripherals if you will, catering for power, connectivity, cables and audio.

It's the latter we're interested in here, with the launch of the Juice Nano Bar Speaker, a small, but surprisingly capable stereo speaker that measures 110 x 63 x 63mm and weighs 265g. This remarkable little Bluetooth speaker certainly has a lot going for it, but can it compete with the countless other portable Bluetooth speakers currently available?

The design of the Nano is better than most of the portable speakers we've come across in the past. The rubberised, non-slip chassis is both sturdy and pleasant to look at, coming in either an all-blue coloured case or all black, with a glittered effect. The top of the Nano bears the Juice name, with three buttons embossed into the rubbery surface: volume up and down and a function button to pick up, reject and hang up any incoming calls when attached to the device and pause any music played via the device.

On one side there's a power switch, micro-USB charging port and an aux port for line-in non-Bluetooth devices to play media through. The front and rear are



▲ The Juice Nano Bar speaker may be small, but it's surprisingly loud



▲ A simple and effective design hides a cracking speaker within

encased in a plastic mesh, behind which the Nano's pair of 40mm 3W drivers sit. Beyond that, there's nothing much else to add to the aesthetics; it's a plain but decent-looking device that's portable enough to be thrown into a rucksack, handbag or in the supplied cloth bag.

In terms of audio performance, the Nano leaves the other portable speakers we've used in the past behind.

It's loud, clear and with a good level of bass that complements the music you'll push through it. Although there are only a pair of 3W speakers in use here, Juice has done a magnificent job of producing some of the best portable audio out of our growing collection of Bluetooth speakers.

It's not just mobile devices that can benefit here either. The Nano does a good job of



keeping up with laptops, desktops, monitors and pretty much anything else that you can feed through the Aux port. However, the NFC and Bluetooth connectivity are where the Nano shines, and connection to a device is a quick and painless affair.

Finally, the 800mAh battery manages to last just over ten hours off a single charge, with a zero to full charge taking around three hours to complete. This time obviously depends on the volume and how often you're connecting and disconnecting from the device, but in our tests we managed to make it drag on for around eleven and a half hours before the Nano's battery packed in.

The Juice Nano Bar is a fantastic portable speaker. It's loud enough for outdoor use, without invading on the privacy of those around you; tough for use in the field; and it's perfect for use in the home. What's more, it only costs £26.99, which is a bit of steal for such a good Bluetooth speaker.

**mm David Hayward**

**A fantastic portable speaker, with equally great sound quality**



# BUYER'S GUIDE

## Intel Motherboards over £100

Intel motherboard range from the super low budget to thousands of pounds, so finding the one that covers all the bases can be quite difficult.

We have six here that cost over £100 and offer the system builder a mix of older CPU sockets, newer generation technology, style and stability for all kinds of users.

## Intel Motherboards over £100

### MSI Z170A Gaming Pro Carbon

#### DETAILS

- Price: £144
- Manufacturer: MSI
- Website: [goo.gl/QZjPJ7](http://goo.gl/QZjPJ7)
- Requirements: sixth-generation Intel CPU, DDR4 memory

**M**otherboard special effects are a growing branch of the component market.

Rather than opting for a separate LED lighting strip, most motherboard manufacturers are now incorporating lighting effects directly onto the PCB itself, including extra connectivity to expand the lighting.

The MSI Z170A Gaming Pro Carbon is the latest model that is designed to deliver great mid-range performance, as well as some eye-candy.

The Gaming Pro Carbon is a sixth-generation Intel Socket1151 board with four DDR4 memory slots, three PCIe x16 slots and four PCIe x1 slots. There's SATA Express, an M.2 port, six SATA ports, and on the rear IO plate you'll find a USB 3.1 Type-C port, one USB 3.1 Type-A port, four USB 3.0, HDMI, PS/2, gigabit Ethernet, DVI and optical S/PDIF.

The Gaming Pro Carbon is a well stocked motherboard, that's much is apparent. However, beyond the technology on the board itself, there's a lot more going on with the design. The motherboard is engineered with a black carbon fibre reinforced polymer, which not only improves the strength of the board but also adds a jet-black look to the surface. Incidentally, this greatly improves the appearance of the LED effects when they're up and running.

Speaking of which, the LED lighting on the Gaming Pro



▲ It's a fantastic motherboard, not too badly priced either

Carbon comes in several parts. There's an LED line along the audio circuit, which delivers a red glow along one side and emanates through the rear IO ports. The second part is an RGB strip that runs down the right-hand side of the Gaming Pro Carbon, next to the ATX power connector.

The lighting can be controlled and customised by using the MSI Mystic Light software. There are four main modes on offer: Static, Breathe, Gradient, Gaming and Music. The overall effect can be quite stunning when applied correctly and when fitted to the appropriate case, and the LED strip can be quite bright when at its peak level.

Other than the lighting enhancements inherent to the Gaming Pro Carbon, the motherboard comes with solid capacitors, improved bandwidth via the LAN Gaming Manager, far better audio quality thanks to the Audio Boost Nahimic Sound Technology, improved protection against power surges, and the excellent Click BIOS 5. That alone is enough to keep most system builders happy, without even touching on the LED side of things.

With the right kit in place, such as an Intel i7-6700K, 16GB

of DDR4 memory and a pair of decent GPUs in SLI or CrossFire, you've got a pretty impressive system on your hands. There's also plenty of room around the CPU for a more elaborate cooling or liquid cooling solution.

Normally, an LED motherboard of this quality and calibre would cost in excess of £180 and beyond, but MSI has managed to sneak the Z170A Gaming Pro Carbon in at a more than reasonable £144, which is pretty impressive considering what you're getting from the motherboard.

All in all, this is a great motherboard even before we get into the lighting effects. With the additional LED options, though, and the low price, the Gaming Pro Carbon is certainly one of the best examples we've seen yet.





## MSI X99S SLI Plus

### DETAILS

- Price: £200
- Manufacturer: MSI
- Website: [goo.gl/pZClv7](http://goo.gl/pZClv7)
- Requirements: Extreme Edition i7/LGA 2011-3 socket, DDR4 memory

Our second MSI motherboard of the guide is a little older, but it's still quite an impressive piece of technology.

The X99S SLI Plus is one of the company's all-black Military edition boards, which significantly ramps up the number of features, style and power compared to the more conventional offering available.

The reason being is that the X99S supports the higher end Core i7 Extreme Edition LGA 2011-3 processors, replacing Intel's previous generation LGA 1366 for high-end gaming and server platforms. The four 16x PCIe slots, supporting quad SLI or CrossFire setups, eight banks of DDR4-3333 (OC) memory up to 128GB quad-channel mode and

SATA Express connectors for the faster generation of SSDs that can churn out an eye-watering 10Gbps transfer rates.

The design of the board is black throughout, with angled and futuristic VRM and PCH heatsinks, Super Ferrite Chokes and aluminium solid capacitors. Needless to say, it's designed to be quite a dominating and formidable-looking component.

As we've come to expect from MSI boards, its OC Engine and OC Genie are incorporated to allow more flexibility when trying to attain higher overclocking results. With the OC Genie, you can press the appropriate button on the board while the system is powered off, and on the next boot the processor will automatically overclock to its optimal performance.

Turbo M.2, Guard Pro, USB Steel Power, ten SATA-3 ports (two of which are reserved for SATAe), four front and eight rear USB 3.0 ports, optical S/PDIF out, five OFC audio jacks and the Command Centre software all make for a board that you would expect to cost in the region of £400 or more. However, MSI has managed to squeeze all this into a reasonable wallet pleasing price of around £200.

Despite the pricing, to get the very best from the X99S you're going to have fit an Intel i7 Extreme Edition processor – something that will easily set

you back the best part of £1,600. It's certainly not going to be a budget setup, and using the cheapest possible LGA 2011-3 CPU will set you back at least £650. It's not called 'Extreme Edition' for nothing, we suppose.

Regardless of the price, assuming you have very deep pockets, the X99S is a rather magnificent motherboard. The Military Class 4 standard that it adheres to creates a super-stable performance motherboard on which to build your next system. Together with the Guard Pro feature, the higher quality components used throughout, the advanced power management and performance, this is a board any serious system builders or those setting up a high performance mission critical server would be pleased with.

If you're after the ultimate in performance computing, then the MSI X99S SLI Plus is an amazing foundation on which to build your system.



▲ The MSI X99S SLI Plus is top-end, performance motherboard

## Intel Motherboards over £100

### Gigabyte GA-X150M-PRO ECC

#### DETAILS

- Price: £103
- Manufacturer: Gigabyte
- Website: [goo.gl/n8jzmh](http://goo.gl/n8jzmh)
- Requirements: sixth-generation Intel CPU, Xeon E3-1200 C232 CPUs, DDR4 memory

Recently Intel decided to remove Xeon support from the main chipset motherboards, and as a result there are two new Xeon-based chipsets: C232 and C236. This has developed into a situation where we now have more consumer focused technology appearing in more conventional workstation setups.

Gigabyte's answer to the C232 chipset is the GA-X150M-PRO ECC, a micro-ATX motherboard that carries the best of the consumer and business worlds.

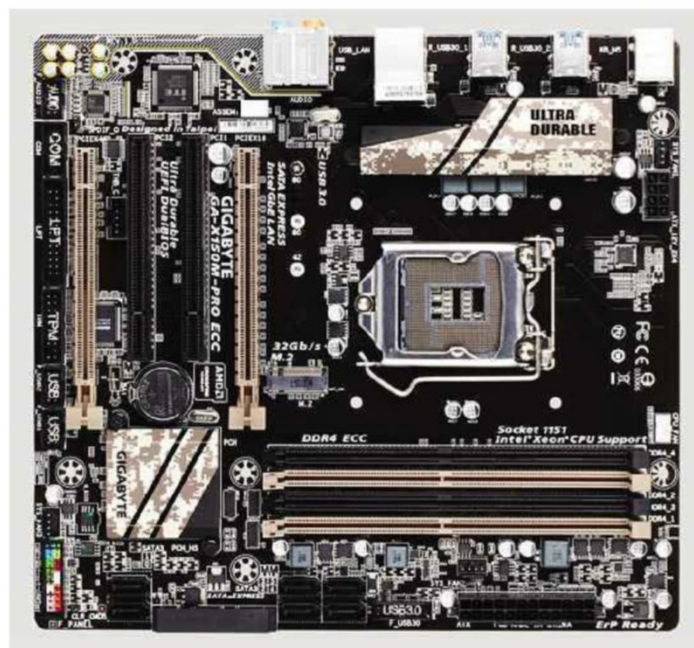
The X150M has an interesting specification: four DDR4 DIMM slots to a maximum of 64GB and 2133MHz, a pair of PCIe X16 slots for AMD CrossFire performance, a further two legacy PCI slots, a single M.2 connector, SATA Express connector and six SATA connections.

Rear IO connectivity is good too, with four USB 3.0 ports, two USB 2.0 ports, PS2 keyboard and mouse, gigabit Ethernet and a six-port audio block – a surprising feature to be found on a business model motherboard.

Another surprising feature is the presence of an LED strip on the underside of the audio chipset, and there's also a camo-theme print on the heatsinks. The lines between a



▲ The Gigabyte X150M-PRO ECC is aimed at both business workstations and consumers gaming setups



▲ Being the best of worlds, it's kind of left itself without a true home

workstation motherboard and a consumer, gaming-centric motherboard are well and truly blurred.

Regardless of who the motherboard is aimed at, there's no denying that this is a professionally designed product. Gigabyte's Ultra Durable and high-quality

components, together with gold-plated parts, dual BIOS and top-of-the-range caps make for a stable platform on which to build your next system – be that something for the business or for the home.

The eagle-eyed among will already have noticed that the X150M doesn't have any video

ports along its rear I/O. Naturally, then, you'll need to factor in a graphics card to be able to see anything, and if you're after an Nvidia SLI setup, you're out of luck, because the X150M only supports AMD's CrossFire, due to keeping the price low by avoiding Nvidia's licensing terms.

Speaking of the cost, the X150M is as surprisingly low. This motherboard costs around £103, which only just makes it into our guide. It does, though, have a decent level of technology available for the cost.

Although a good motherboard, the X150M doesn't seem to slip into any particular role with ease. On one hand, it'll support up to Intel Core i7-6700K processors, but it lacks some of the gaming punch that a full consumer-based board offers. On the other hand, it supports up to Xeon E3-1275 v5 processors, but it's probably not the kind of motherboard the head of IT would happily allow you to order.

This leaves the Gigabyte GA-X150M-PRO ECC motherboard hanging in a kind of technology limbo; while good, it's not what either consumers or businesses would initially opt for. Perhaps it's a little niche, then, but an interesting board nonetheless.





## ASRock Z97 Extreme6

### DETAILS

- Price: £149
- Manufacturer: ASRock
- Website: [goo.gl/3KbVMX](http://goo.gl/3KbVMX)
- Requirements: 4th generation Intel CPU, DDR3 memory

While the ASRock Extreme9 is considered the better motherboard in its product range for supporting the older Intel Z97 chipset, the lesser used Z97 Extreme6 has a lot going for it and it can be found well within the guide budget too.

The ASRock Z97 Extreme6 is an ATX board that supports Socket 1150 Intel Core i3, i5 and i7 processors. It has a single bank of four DDR3 DIMMs with a maximum capacity of 32GB and two M.2 connections, one of which is an Ultra M.2 connection.

The rear of the board connectivity is good, with a single PS/2 mouse and keyboard port, HDMI, DisplayPort, optical S/PDIF out, eSATA and six USB 3.0 ports. Interestingly, there are a pair of Intel gigabit Ethernet ports, which can work in tandem, as well as a five port audio block and a clear CMOS button.

Internally, the Z97 Extreme6 has two PCIe 3.0 x16 slots, a single PCIe 2.0 x16 slot, a pair of PCIe x1 slots and a single mini-PCI Express slot. Naturally, there's plenty of scope for a multi-GPU setup on this motherboard, should you so wish.

Aside from the pair of M.2 connectors, the storage on the Z97 Extreme6 is actually quite good. You'll get ten SATA 6Gbps connections, two of



▲ The ASRock Z97 Extreme6 is an older board, but well worth looking into



▲ There are some interesting features here, but it's a bit pricey for an older motherboard

which are shared with a single eSATA port and a single SATA Express connector.

The board is reasonably well laid out, with enough room between the PCIe slots for big graphics cards. The only issue

you may come across is fitting multiple graphics cards in with the M.2 slots filled, as it can be a little close, depending on the GPUs you use.

We rather liked the blue and black theme used across the

ASRock Z97 Extreme6. It may not be quite as dominating or as sports car looking as the MSI boards in this guide, but it's certainly effective enough and will undoubtedly look good in a well-planned system. In fact, there's something slightly retro about the look that reminds of an older MSI MMX motherboard.

Overclocking and performance setups are handled well. The board features good all-round quality components and large aluminium heatsinks. Equally, there's some room for overclocking in the accompanying software, although it's not a main selling feature of the board.

The ASRock Z97 Extreme6 is a pretty good overall motherboard and can be found for £149 or thereabouts. It's a little higher in price compared to the Gigabyte X150 and the MSI Carbon, but there's plenty on offer here, and it's a well-built board.

£149 may be a bit pricey for a non-sixth-generation Intel motherboard, but there are plenty of users out there with spares who can easily be added without the need to purchase DDR4 or anything else for that matter.

In short, it's a good last-gen Intel motherboard.



## Intel Motherboards over £100

### Asus Maximus VIII Hero

#### DETAILS

- Price: £200
- Manufacturer: Asus
- Website: [goo.gl/sZqUrH](http://goo.gl/sZqUrH)
- Requirements: sixth-generation Intel CPU, DDR4 memory

The Asus Hero range of motherboard has had a good run over the last couple of years and, let's face it any motherboard you decide to call the Maximus Hero has to have something pretty special about it.

This latest version of the Hero ROG (Republic Of Gamers) range, the Maximus VIII Hero is a highly regarded Z170 chipset motherboard with support for sixth-generation Intel processors for the 1151 socket family. You'll find four DDR4 memory slots for a maximum of 64GB, six SATA 6GB/s connections, an M.2 x4 Socket 3 connection, two USB 3.0 ports and two USB 3.1 ports, four USB 2.0, optical S/PDIF and a Republic of Gamers SupremeFX 8-channel HD audio chip.

There's multi-GPU support in the form of three PCIe x16 slots, with the first at x16 and the second at x8 when populated, and if the third slot is occupied, then it'll drop to x4 mode. In among the GPU slots there are also three PCIe x1 slots.

It's a very nicely designed motherboard, with it looking more sleek and slightly less colourful than its predecessor, the VII Hero – a motherboard we really liked when it was available a year or two ago.

As well as being an ideal multi-GPU motherboard, the Maximus VII Hero also comes with a few extra aces to its



▲ The Asus Maximus VIII is a splendid motherboard



▲ It's not cheap, though, but worth the money for a high-end system builder

name. There's a strip of red LEDs running around the board that light up and highlight certain areas of significance along the PCB – such as the PCH cooler and ROG-branded components.

You also get ROG improved Ethernet connectivity, with LANGuard and GameFirst III features, and there are a

couple of buttons on one edge of the Maximus VII Hero that can boost the output to your headphones or speakers – called Soundstage – and instantly apply your favourite audio settings in-game regardless of the operating system; the other button clears the CMOS after an unsuccessful overclock.

It's an exceptionally capable motherboard that offers all manner of gaming and performance benefits. It's not just gaming technology that's at work here either; you'll get server-quality electromagnetic shielding, improved voltage control, more efficient capacitors, chokes and countless other components you never even knew existed.

One feature we did like, and one that will make a significant performance improvement to a system, is the ROG RamCache. As the name suggests, this is a feature that allows you to allocate up to 2GB of your system memory to cache any of the drives in the system. So even if you have the fastest read and write SSD in place, it'll be boosted by intelligently accessing files stored in the memory. The downside, as with most RAM cache features, is that a power cut could cause issues, because the files can't be written back quick enough. It's a risk most users are happy to accept, though, for that extra speed boost.

The Asus Maximus VIII Hero is a fantastic motherboard, but it's not the cheapest we've seen. But if you're serious about your components, then it's worth every penny.





# ASRock Fatal1ty X99X Killer/3.1

## DETAILS

- Price: £250
- Manufacturer: ASRock
- Website: [goo.gl/nw2rLG](http://goo.gl/nw2rLG)
- Requirements: sixth-generation Intel CPU, DDR4 memory



The Fatal1ty Killer series of motherboards are ASRock's premium range of gaming and extreme, top-of-the-range products. The style of each of the boards, as well as the range of features, makes for impressive reading and, if you have the right components, one of the fastest systems you're likely to build.

The ASRock Fatal1ty X99X Killer/3.1 is an upgrade from last year's Fatal1ty X99X Killer – the difference being the addition of a pair of USB 3.1 Type-A ports mounted on a PCI card. It may not sound like much, but to a gaming system builder we're sure it's music to their ears.

This is an ATX motherboard that supports LGA 2011-3 socket, i7 Extreme and Xeon 18-core processors. The two banks of four

DDR4 memory slots can take a maximum of 128GB, and you'll find a single Ultra M.2 connector between the first and second PCIe slot.

Speaking of which, the Fatal1ty X99X/3.1 has three PCIe 3.0 x16 slots, two PCIe 2.0 x1 slots and a single mini-PCI

Express slot. Depending on the type of CPU you pair with this motherboard, you'll be able to get a triple-GPU setup of x16/x16/x8 – for 40-lane CPUs, otherwise it'll be x16/x8/x4 for 28-lane CPUs.

Rear IO connectivity consists of a single PS/2 mouse/keyboard port, one eSATA port, two USB 2.0 ports – of which one is a dedicated Fatal1ty mouse port, four USB 3.0 ports, a pair of gigabit Ethernet ports, a five-port audio block with S/PDIF out, a clear CMOS button, a USB 3.1 Type-C port and the aforementioned USB 3.1 port which, as we mentioned, are mounted on a PCI card.

In terms of storage connectivity, the Fatal1ty is pretty well equipped. There are ten SATA 6Gbps connectors, a single eSATA connector and the Ultra M.2 port.

The obvious advantage the Fatal1ty offers compared to more conventional

motherboards is the fact that it's designed for gamers. This means you're getting higher class components, better than average cooling and plenty of motherboard software to help give you an advantage when gaming.

Although there's plenty to like about the Fatal1ty X99X/3.1, it's probably a little too much for most users who require a good but a little less busy motherboard. As you would expect, the ASRock Fatal1ty X99X/3.1 is priced pretty high. In fact it's the highest in this guide at around £250, depending on where you shop.

However, for £50 more than the Asus Maximus VIII Hero and the MSI X99S SLI Plus, you're getting a pretty superb example of a top-end gaming motherboard. If that's something you're after and the system you're building demands the best, then this is without a doubt the perfect motherboard to build from.



▲ The ASRock Fatal1ty X99X/3.1 is a marvellous motherboard

# Linux: From A-to-Z

**David Briddock continues the series with the letter L**

**T**his week's topics are live distros, LXDE, LibreOffice and Linus Torvalds.

## Live Distros

Once upon a time to experience Linux you had to replace your existing operating system or create a so called dual-boot system. But in the late 1990's we saw the rise of the live distro image. With a live image you can get a taste of Linux just by inserting a pre-loaded CD/DVD or USB stick into your PC and rebooting.

“ LXDE is particularly suitable for resource-constrained PCs, netbooks or system-on-a-chip boards ”

When using a read-only CD/DVD the Linux kernel is loaded into memory. This means any changes are lost the next time the PC is rebooted, but it also makes this option super secure. However, by using a USB stick configuration changes and data files can be saved, meaning after a reboot you can resume from where you left off last time.

These days you can download a wide variety of boot-and-try Linux live ISO images. It's a great way to check out your PC's compatibility with the latest Linux distro release, or experiment with an entirely new distro; without committing to a full install.

## LXDE

An abbreviation for Lightweight X11 Desktop Environment ([lxde.org](http://lxde.org)) this popular graphical desktop is noted for its ability to work with comparatively low processor power and memory

requirements. This means LXDE is particularly suitable for resource-constrained PCs, netbooks or system-on-a-chip boards, like the Raspberry Pi.

Started in 2006 by Taiwanese programmer Hong Jen Yee, and written in the C language, LXDE is the default desktop for Knoppix, Lubuntu, LXLE Linux and the Raspberry Pi Foundation's official operating system Raspbian.

Unlike other major desktop environments, such as GNOME, the components of the LXDE desktop are largely independent and only loosely

integrated. This makes it easy for developers to create a customised LXDE implementation by installing only the packages they want to use.

## Libre Office

Oracle Corporation took ownership of the OpenOffice project after acquiring Sun Microsystems in January 2010 for \$7.4 billion. This free Microsoft Office rival had a familiar looking collection of apps that covered word processing, spreadsheet, presentations, diagrams, drawings and database management. It could also load and save Microsoft Office format files.

But it wasn't long before Oracle's management of this open source project raised tensions within the OpenOffice development community. After a big fallout community members formed The Document Foundation in September 2010 and in the process forked the existing

Open Office code-base to create the initial LibreOffice project ([libreoffice.org](http://libreoffice.org)).

## Linux Torvalds

Unlike many aspects of computer technology there's no question who's the father of Linux. Linus Torvalds was introduced to the UNIX operating system at the Helsinki University. Taking inspiration from Andrew Tanenbaum and his MINIX system, a stripped-down version of UNIX, Torvalds set about building his own UNIX-like system kernel.

Torvalds posted the source code for the very first Linux kernel onto the Internet in September 1991. It proved to be an instant hit with the open source community and soon hundreds of software developers were contributing new code, bug fixes and suggestions.

Despite relocating to the United States, working for other companies and starting a family Torvalds, with his handpicked team of collaborators, retains an iron grip on the direction and design of the Linux kernel. [mm](#)



▲ Linus Torvalds



# Component Watch

**This week, James has found some deals on high-definition displays...**

If you want a monitor that's better than HD but you're not quite ready to drop hundreds on a 4K screen, there's a resolution for you: WQHD, which is 2560 x 1440, or four times the resolution of a standard 720p panel. By looking at these monitors, you'll still get superb visuals and plenty of desktop space, but unlike 4K, you can spend the extra money on better features instead of more pixels...

**Deal 1: BenQ BL2420PT**

**RRP: £281.99 / Deal Price: £203.48**

The BenQ BL2420PT is an IPS screen with 5ms response time and a special CAD/CAM mode aimed at designers and professionals. Inputs include a VGA port, HDMI port, DisplayPort and DVI-DL port. Built-in speakers and flicker-free design make it great for those who need a precision all-in-one work solution, while the fully adjustable base means you'll never have to end the day with a sore neck again.

**Where to get it:** Scan – bit.ly/2fX6C2e



**Deal 2: AOC Q2577PWQ**

**RRP: £264.99 / Deal Price: £239.99**

This 25" screen has an inch on most of the others at its price, and that makes it an intriguing prospect – especially since it's not that expensive. Again, it has VGA, DVI, HDMI and DisplayPort inputs, and again there are built-in speakers. But that extra inch is what makes it worth thinking about, even if it means a slightly lower pixel density. AOC might not be the most well-known name in monitors, but it's high quality enough to be worth paying this amount of money for, especially if you want a large, high-res screen.

**Where to get it:** Overclockers – bit.ly/2ggT6aX



**Deal 3: Asus PB258Q**

**RRP: £329.99 / Deal Price: £254.99**

At the extreme high end of pricing, this Asus PB258Q has greater fidelity than other monitors, with a high-end panel and image accuracy enhancements, and Asus SplendidPlus video

intelligence technology to give you the most vivid and accurate colours possible. Again, there's a low blue light mode and a low power mode for energy saving. Ports include HDMI, D-Sub, DisplayPort and Dual-Link DVI-D, so you won't struggle to connect it. Best of all, it's wall-mountable: if you're in the mood for a serious display setup, the stand snaps right off.

**Where to get it:** Ebuyer – bit.ly/2eFsaR6



**Deal 4: Asus VX24AH**

**RRP: £299.99 / Deal Price: £259.99**

This gaming monitor has dual HDMI and D-Sub inputs, a frameless design and built-in speakers for a high-quality gaming experience. There's also a VGA input and earphone jack, and a number of different settings including a special low-blue mode for night time use. Reduced in price by a solid £40, it's a great all-in-one package for anyone who wants a larger, more precise screen.

**Where to get it:** Overclockers – bit.ly/2fVHqFR



**Deal 5: Dell U2515h**

**RRP: £274.80 / Deal Price: £277.82**

Dell's monitors are always high quality, and this ultrawide IPS is a great high-end all-rounder. A 6ms response time, it's height-adjustable and wall-mountable, and it's got Dell's reliability and eco-efficiency enhancements that keep its performance strong. There's also a three-year limited hardware warranty and three-year advanced exchange service, so if anything does go wrong, there'll be a replacement with you shortly. In addition to dual HDMI, DisplayPort and mini-Displayport connections, it's got a five-port USB hub, one of which can be used for charging.

**Where to get it:** Box – bit.ly/2fFe7b5





# The 10 Best Superhero Games For PC

They're not always great, but Rob Leane has picked out a few gems...

**T**he combination of being a comic book fan and a PC gamer isn't always an easy one. Back when *Spider-Man 2* was being heralded as one of the best offerings ever produced for PS2, PC players were lumbered with a totally different product that wasn't up to snuff. Last year we ended up in a similar position again: as *Arkham Knight* took the console world by storm, it became apparent that the Windows version was glitchy, unfinished and a big waste of money.

If both of those occurrences affected you, you might think that there aren't any decent superhero games for PC-owners to play. Thankfully, though, you'd be wrong. These ten are genuinely excellent... (N.B. An honourable mention goes to *Batman: The Telltale Series*, which offers gripping point-and-click thrills, mostly from the perspective of Bruce Wayne in his civvies. Only the first two chunks of the game have been released thus far, though, and it doesn't seem fair to put a game we haven't finished in a list like this).

## 10. X-Men Legends II: Rise Of Apocalypse

The sequel to the brilliant *X-Men Legends* (which sadly didn't come out on PC), *Rise Of Apocalypse* is a terrific game for fans of Marvel's memorable mutants. It's an action role-playing game offering single player and multiplayer modes. The basic story set up is that uber-powerful ancient mutant Apocalypse has shown up and decided to conquer Earth.

To stop him, the heroes and villains under the banner of Marvel's X-Men brand decide to team up. You'll be faced with

an impressively lengthy barrage of missions, and you'll have to pick the four best mutants to take with you each time. Their unique powers are very enjoyable to explore, although the repetitive nature of the game's structure does grate a bit during long sessions.

## 9. Saints Row IV

The sandbox series *Saints Row* began as a gang-based action title stuffed with street battles and car chases. Somehow, when the fourth game came to PC and consoles in 2013, the franchise had morphed into an alien invasion story stuffed with superpowers.

Not only is the player character inexplicably elected the President Of The United States, but soon after the game begins he's imbued with amazing abilities as well: telekinesis, super speed and massive jumping skills, alongside elemental talents that let the player manipulate fire and ice.

The game – much to my surprise – ended up being one of the best superhero games ever. The story is utterly barmy, the gameplay is great fun and you'll get a decent amount of carnage-laden hours out of it.

## 8. Marvel Heroes 2016

The canon of Marvel comics is chock-full of iconic superheroes, many of whom have never been given the chance to shine in their own solo gaming title. While *Marvel Heroes* doesn't remedy that, it does offer fans the chance to lark around with their favourite Marvel heroes in a massively multiplayer online action role-playing environment.



The game includes a few optional microtransactions if you're not bothered about parting with a bit of money, but refraining from spending cash doesn't diminish the fun of tackling missions with your chums – embodying anyone from Iron Man to The Punisher and addictively attempting to level up in order to gain extra powers. The raids (when 10 of your friends have to take on unique bosses against a timer and a death limit) are particularly fun, and the roster of over a hundred playable characters is bound to keep you interested in the long-term.

## 7. Prototype

Much like *Saints Row IV*, *Prototype* wasn't based on any pre-existing superhero property like all the others on this list. And, similarly to how that game turned out, it's pretty darn brilliant. *Prototype* is a straight up action-adventure title which is perfect for comic book fans who feel that *Spider-Man* and *Batman* really aren't coming to our gaming systems regularly enough.

The player-character is Alex, whose main superpower is shape-shifting. This lets him transform into anyone he pleases, and it also comes in handy during a fight (there's something strangely satisfying about absorbing someone into your belly as a means of defeating them). The story's pretty simple (uncovering secrets of the past, stopping escaped monsters), but the barmy fight mechanics make up for it.

## 6. Injustice: Gods Among Us

*Injustice: Gods Among Us* finally gave us a modern version of what *Tekken* would look like through a comic book lens. Far more than the *Marvel Vs Capcom* or *Mortal Kombat Vs DC Universe* games ever did, *Injustice* lets you truly get inside the mechanics and tactics of a superhero bust-up.

The only flaw is the 2D fighting space, these days you almost can't help but wish for a few more angles to amp up the action as you go toe-to-toe. The quality of the graphics, the story (a really dark one involving the Joker, Superman and Batman), and the sheer joy of dishing out a super-powered beat down comfortably compensate for that, however.

## 5. LEGO Batman 3: Beyond Gotham

Traveller's Tales' LEGO videogame series has been continuously impressive since it established its winning formula with *LEGO Star Wars* back in 2005, offering up playful yet challenging multi-franchise experiences for all ages to enjoy. There are three Batman-focused instalments in the series so far, and they're all worth a play if this is your sort of game. My personal favourite, however, is *LEGO Batman 3: Beyond Gotham*, because this one really embraced the broadness of the DC Comics fandom.

As well as the usual mix of main missions and optional extras, with *LEGO Batman 3* you also get cameos from the likes of former Batman Adam West, incumbent Green Arrow Stephen Amell and legendary movie writer/DC mega-fan Kevin Smith. It's fun for everyone, but DC fans will get extra layers of enjoyment.

## 4. Ultimate Spider-Man

*Ultimate Spider-Man* is the answer to those 'the PC version of *Spider-Man 2* really sucked' woes. It has simple-but-effective web-slinging mechanics, comic book throwback graphics and an engaging story following a young Peter Parker and his chum Eddie Brock after the invention of the Venom symbiote.

In many ways, *Ultimate Spider-Man* feels like a throwback to the classic *Spider-Man* game from 2000 and its sequel *Enter Electro* (the latter of which didn't make it to PC for some reason). *Ultimate Spider-Man* has everything a Spidey game should have, from the quips, to the thwips, to the bevy of iconic baddies.

## 3. LEGO Marvel Superheroes

As much as I love *LEGO Batman 3: Beyond Gotham*, it doesn't quite nab the crown of being the best superhero-themed instalment in the franchise. That honour goes *LEGO Marvel Superheroes*, which reinvigorated the Traveller's Tales series with its hugely impressive scope and uncountable imaginative ideas.

The Marvel characters and LEGO feel like a perfect match together, with hundreds of characters and all their wacky abilities providing many great moments of problem solving, both inside the levels and in the free-roaming Manhattan where you spend your time in between. I often get bored before 100%-ing LEGO games, but with this one I never did.

## 2. Arkham Asylum

Marvel has made some very good videogames, but nothing they've done gets anywhere near DC and Rocksteady's amazing work on *Arkham Asylum*. A simple starting point (the lunatics taking over the asylum) gives way to a twisty narrative, which is brought to life by the best voice talent in the business (Kevin Conroy, Mark Hamill, and plenty more), some highly slick graphics, tricky stealth levels, trippy hallucinations and easy-to-learn-but-tough-to-master fighting mechanics.

This is the sort of game that you'll play again and again, straining not to miss anything and to secure that elusive 100% completion score. I'd say *Arkham Asylum* was perfect, if I didn't know that they somehow made the sequel even better...

## 1. Arkham City

And finally... the best PC game for superhero fans has to be *Arkham City*. Building on the stellar execution of *Arkham Asylum*, Rocksteady pulled together a bigger and better sequel. With Gotham's criminally insane contingent relocated to a sprawling inner-city complex, and a chilling new baddie in the shape of Hugo Strange, *Arkham City* let Bats loose within an extraordinary gaming experience.

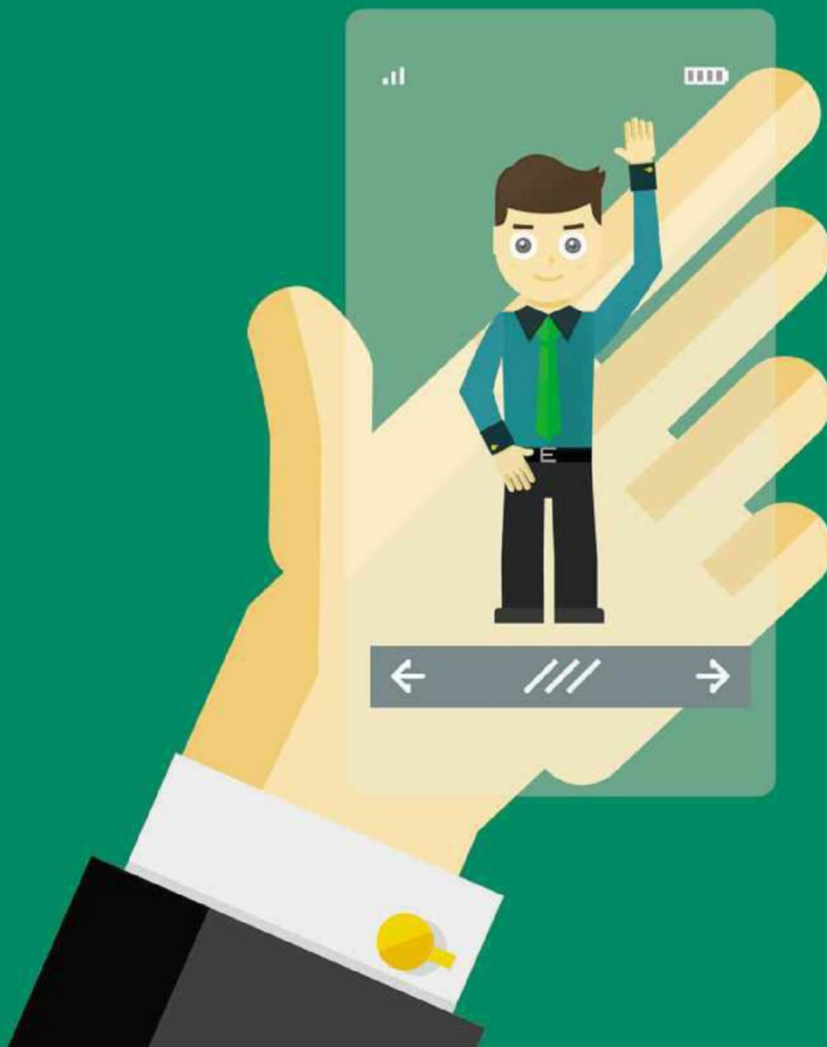
There are also some really imaginative moments, like the opening sequence where you have to play as a not-suited-or-booted Bruce Wayne and the jaw-dropping plot point at the end. It's just a shame that *Arkham Origins* was naff and that the PC release of *Arkham Knight* was botched, because the two games that came before them were pretty much perfect. [mm](#)



# Battle Of The Virtual Assistants – Microsoft vs Apple vs Google

As predicted by Star Trek, it looks like we'll be talking to our computers soon. Or, more specifically, an AI personal assistant.

**Roland Waddilove** compares the current crop





**T**he digital personal assistant would appear to be one of the next big battlegrounds in tech, and many companies are pouring a lot of money, time, and talent into developing them. These are apps and services that are intelligent, interactive, can perform tasks that make life easier, and keep you updated with the latest information on things that interest you. The names are now pretty well-known: Microsoft has Cortana, a key component of the Windows 10 operating system; Google has Now on Android and iOS, and also Assistant in the latest Pixel phone; Apple has Siri, which is on iOS and also in macOS Sierra, the latest Mac operating system. Other companies are getting into digital personal assistants, too, such as Amazon with Alexa.

Digital personal assistants combine many different functions and capabilities. Probably the most obvious is the natural language processing and voice interaction. For years we've been expecting it, but now voice does really appear to be the next big development in computer interfaces. Finally, you can speak to a personal digital assistant in a pseudo-natural way, mostly, and ask questions like "Will I need an umbrella tomorrow?"

## “ Admittedly, Google Now is a bit spooky in the way it uses what it knows about you ”

The assistants can now turn your speech into words, and then analyse them for meaning. For example, the key words here are 'umbrella' and 'tomorrow'. Umbrella is linked to rain, which is associated with weather forecasts. Tomorrow is obviously a time, so the assistant looks up the weather forecast for tomorrow and provides an answer like "Yes, it will rain tomorrow," or "No, it will be hot and sunny tomorrow." This may be displayed on the screen, spoken out loud or both.

Information can be looked up by digital personal assistants by searching the internet, and in some cases they can display or speak the information directly. You can ask questions like "What is the capital of Australia?" You can ask "How far is it to the moon?" Say "What is the current FTSE 100 index?" The questions you can ask seem endless.

Digital persona assistants can control some apps on the computer, phone or tablet and you can tell them to create an appointment in your calendar, remind you later about something, set an alarm for a particular time, or create an email and send it to someone, and much more. The range of apps and the functions they can perform is constantly growing.

The more digital personal assistants know about you, the better they work and this is brilliant when you want information or to get jobs done, but there are also privacy concerns. There is a trade-off between benefits and privacy and you cannot have both. An assistant or the device it is on might track your location, remember web searches, store your commands and queries, access your contacts and so on. This can enable it to perform tasks, such as showing reminders when you visit or leave a location, or email contacts without you having to spell out the email address.

Not everyone is happy with the lack of privacy and some people have turned off Cortana in Windows 10 for example. The voice interface is here to stay though and it is likely that in the future we will increasingly come to rely on intelligent assistants for many functions. You will type less and talk more.

## Google Now And Assistant

Google has been deeply involved with artificial intelligence research for a few years now, and has parlayed that work into its personal digital assistants. Google voice search was the company's first attempt to provide a digital assistant, and for a long time it has been possible to speak into a computer, phone, or tablet to search the web instead of typing your query. Google Now incorporates voice search, but it goes much further and it provides information without you asking. Now is part of the Google app, which is available on both Android and iOS. It is more integrated into Android, though, and can do more on that platform than it can under iOS.

Google Now is capable of finding information even before you know you need it. It uses the company's search, mapping, mail, calendar, and other services to guess what information you might need and then it provides it on cards. Open the Google app and there will be one or more cards that you can browse through. For example, a card might show the weather forecast for the next few hours or the rest of the day and this is useful if you are planning to travel. You can see whether to take a coat and umbrella or sunglasses.

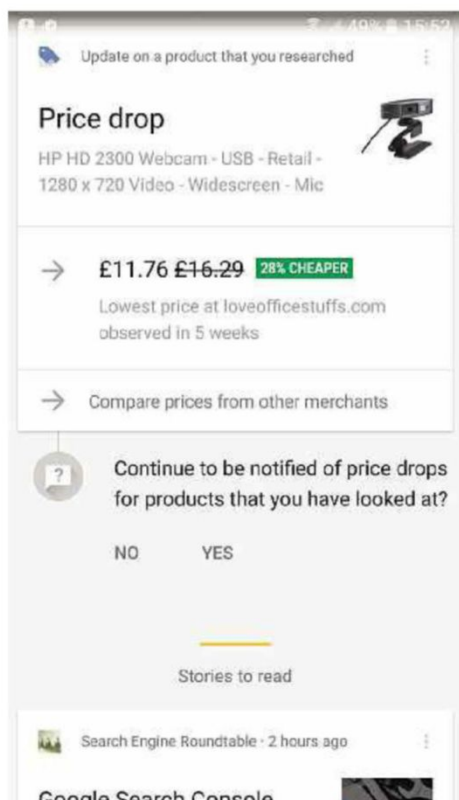
The app can detect the places you usually travel to and from, such as home and work. While you can manually add this information in the settings should you wish, it is often intelligent enough to work out the locations itself. Therefore, when it knows that you travel to work at 8am every day, a travel card might appear with useful information like the amount of traffic on the route if you use a car or bus, and knowing the distance and the traffic situation, it can provide an estimated travel time. This means that you only have to turn on your phone and look at the Google app to see how long your daily work commute will take, or the time it will take to get home when leaving work. There is no need to search for the information you need. This is an example of how it can provide useful information without it specifically being asked.

It can even remember where you parked your car, no doubt using GPS to detect that you are travelling at speed in a car and then becoming stationary when you park. This enables it to provide the parking location on a card without being asked. That could be useful if you are visiting a place you haven't been before, such as on a trip.

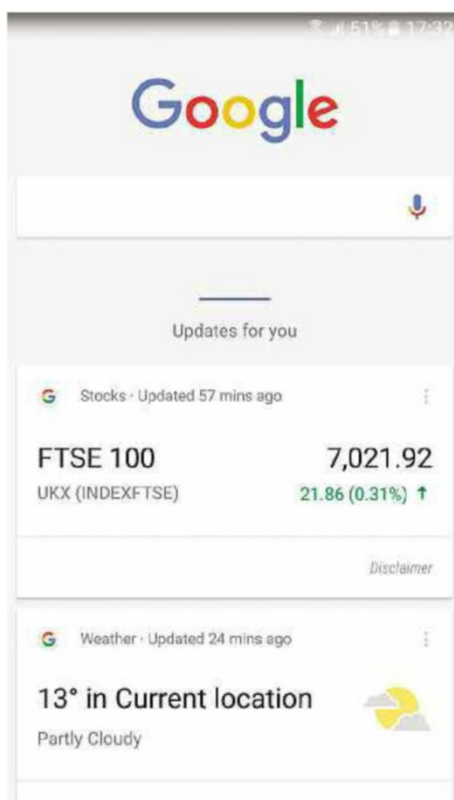
Admittedly, sometimes Google Now is a bit spooky in the way it uses what it knows about you. For example, you might use Google on your PC to search for products, such as a new television, electric toothbrush, or phone. However, Now will regularly examine your search history and if an item you looked up changes price, such as when it is discounted in a sale, a Now card may pop up on your mobile device informing you of the price drop.

### 10 Funny Things To Ask Cortana

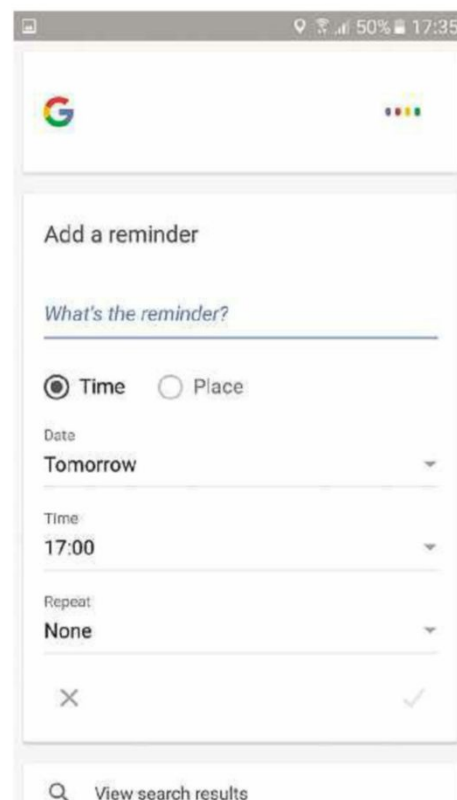
1. Can I change your name?
2. Who is your boss?
3. How old are you?
4. Are you intelligent?
5. What's up?
6. Can you speak Klingon?
7. How do I look today?
8. Knock knock...
9. Are you sleeping?
10. Can you sing?



▲ Google Now knows what you searched for and provides price updates



▲ Google Now displays cards contain information you are interested in



▲ Create calendar appointments, reminders and more with Google Now

In addition to weather reports and travel information, Google Now can show local places of interest, which is useful when you are on trips and holidays and are looking for things to do. If you tell the app what sports teams you are interested in, it will keep you up to date with the latest information, such as matches, scores, players and so on. Cards are displayed whenever there is relevant news and there is no need to specifically search for it.

“ Google Assistant is a technology that can be built into others things, such as the new Google Home wireless speaker ”

In the latest update to the Google app is support for offline voice actions and the device it is running on can be controlled. For example, it is possible to play music, turn on the wi-fi, turn on the torch, and perform other simple actions. For example, tap the microphone in the Google app and say 'Play some music'. You can use lots of variations of this such as 'Play rock music' or another genre, or you can specify your favourite artist, track or playlist. This feature makes use of Google Play Music and you either need to have your own music on the phone or tablet, or subscribe to the Google music service.

Google Now is not just for Google apps and others can interact with it. For example, Spotify can make playlist

suggestions, Airbnb can show rentals you might be interested in, Strava fitness apps can show updates like weekly progress reports, there is stock market price information and the share prices of companies can be tracked and more.

The launch of the Pixel phones might mean an eventual end to Google Now. The Pixel incorporates a new assistant, which is basically more powerful and more capable than Google Now. It is built into the new Pixel phones, but the company has said that Assistant, for that is its less-than-imaginative-but-at-least-descriptive name, will be available for other devices next year. It is not clear whether this will be a separate app or whether the technology will be incorporated into Now as an update.

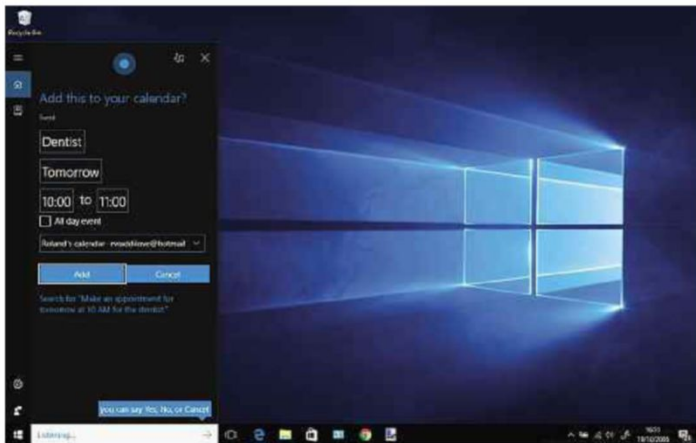
Google Now is a phone and tablet app, but Assistant is a technology that can be built into others things, such as the new Google Home wireless speaker. You can interact with it by speaking naturally and it can play music, get the information you need, perform actions on other devices like turning on network-connected lighting or heating, or playing something on TV through a Chromecast dongle.

Assistant has more intelligence and greater capabilities, so if you enquire about local restaurants, and one sounds like it could be good, you can then use it to book a table. At least that is what is promised. A lot of the functionality is still in its early stages and, of course, it requires links with other services. For example, the restaurant would need to be online and able to respond to the Google Assistant booking request for example.

## Microsoft Cortana

The development of Windows 10 seemed to spark Microsoft's interest in digital personal assistants and artificial intelligence, and Cortana was built into the operating system from the start. Although it is primarily thought of as a Windows 10 feature,





▲ Cortana is able to create calendar appointments, reminders and more



▲ Cortana can show relevant up-to-the-minute information like traffic

Microsoft has released Cortana apps for both Android and iOS. However, if you visit the app store on your phone or tablet you will find that they are not available. At the moment it seems that Cortana on mobile is really only an option if you live in the US, and availability is not as universal as Google Now.

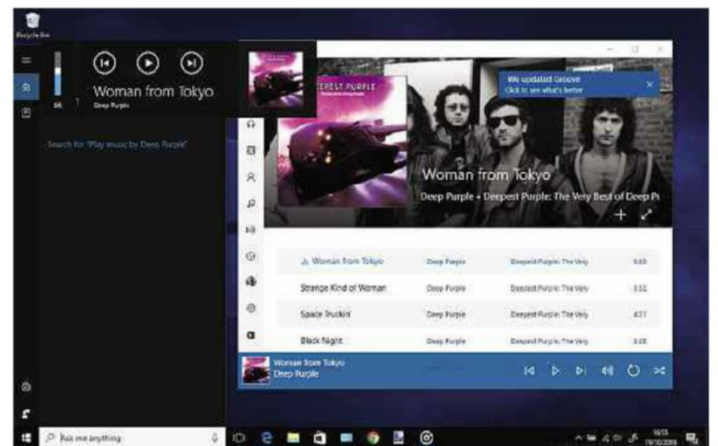
Effectively, with the failure of Windows phones, Cortana is now really just for desktop PCs. However, the digital assistant is steadily improving and is able to listen to your spoken instructions and carry them out. Voice is the primary interface with Cortana, but in addition to carrying out actions by interpreting spoken commands, it can also produce a stream of information that is relevant to you and which depends on your location, interests and preferences – all in a similar way to Google Now.

“ It seems that Cortana on mobile is really only an option if you live in the US ”

To set these up on your Windows 10 PC, click on the search box in the taskbar and then click the Notebook icon. In the Eat & Drink section you can tell Cortana how often you like to eat out, the time you normally have lunch, whether you are a vegetarian, how far you are willing to travel, and what types of food you like best. Cortana will then display cards with nearby restaurants that match your preferences from time to time. That's a fascinating idea and the suggestions are pretty good.

Events cards can show local events that are about to take place, such as sport, music and the arts so you don't miss them. Turn on Films & TV, and cards can then display show times you might be interested in. The Finance cards can be configured by adding the companies you want to follow on the stock market and you'll see the latest share price for them on pop-up cards. Cortana decides when it is best to show them.

Getting around cards show travel information like routes, times, and traffic. They can be configured to show either driving or public transport, and you can be reminded when to set off for work or leave to go home. It is just a gentle reminder rather than a jarring alarm. On the go cards are similar and, when they are enabled, they can suggest things when you leave for work,



▲ Tell Cortana what music to play and it will begin playing in seconds

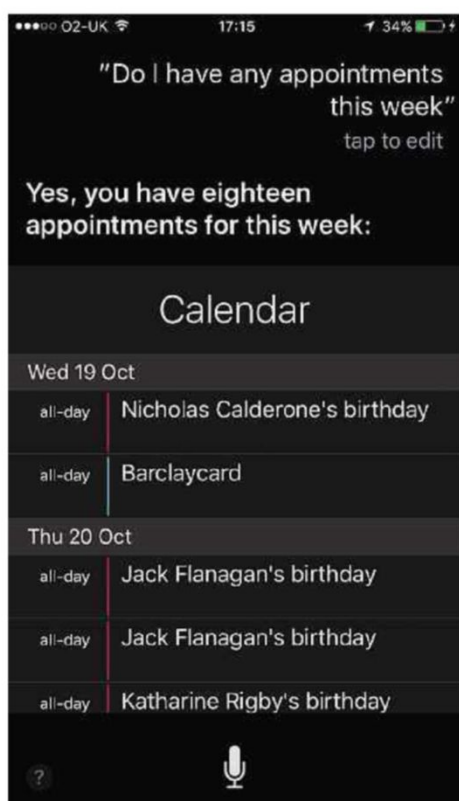
arrive at work, leave for home, or arrive at home. This would obviously be more useful on a mobile phone that is permanently on and is less useful on a laptop PC that might not be. It still has its uses, though.

News cards can be configured to show the latest stories on topics that interest you. Broad categories can be selected like UK news, world news, business, technology, sports and a few others, or you can add specific topics, which can be on almost any subject. Just enter any keyword and you will see news stories on cards in Cortana.

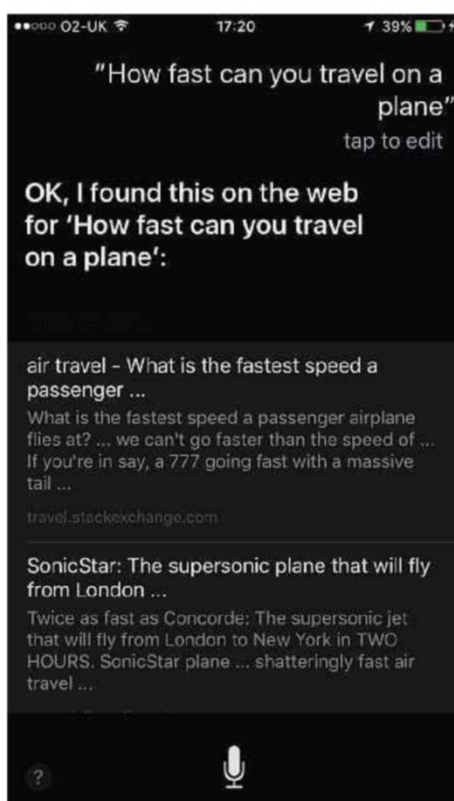
Several of Cortana's cards that provide handy suggestions and useful information are only really useful if you travel. Some cards don't work on desktop PCs because you don't leave or arrive at places, the restaurants around you never change and neither do

## 10 Funny Things To Ask Google Now

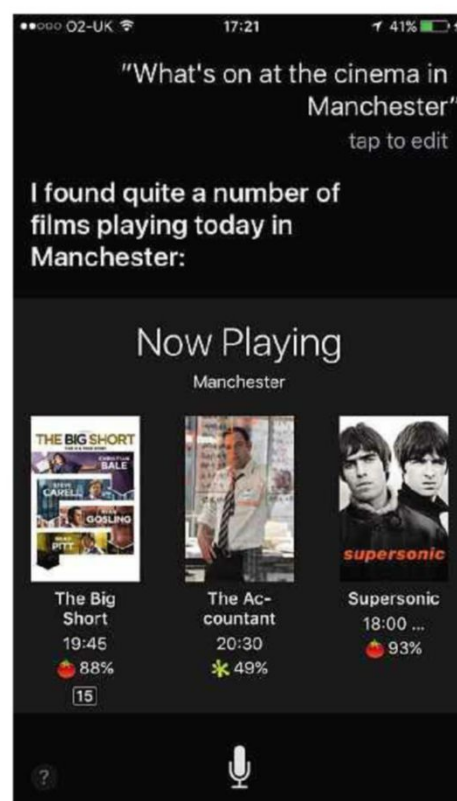
1. Do a barrel roll
2. What's the loneliest number?
3. What does the fox say?
4. Beam me up Scotty
5. Who are you?
6. Who's on first?
7. What is the Bacon number of [actor's name]?
8. Make me a sandwich
9. Roll dice
10. Up up down down left right left right



▲ Siri can show information from calendars, reminders, notes and more



▲ Ask Siri a question and you can get results from the web



▲ Siri knows about current events and films. Just ask for details

the places of interest. This is true of Google Now too, but while Google's app works on all Android and iOS mobile phones, Cortana does not. If you travel with a laptop and use it out of the home or office, then you can get some of the benefits from travel-related information cards, but Cortana would be so much better on a mobile.

Cortana is not just a stream of pop-up information cards, either. It is also capable of performing many common tasks on your computer. The voice interface is an alternative to using the mouse, keyboard, or touchscreen. For example, you can create or view calendar appointments by speaking to your Windows 10 PC. For example, say 'Hey Cortana! Make an appointment for tomorrow at 11 o'clock'. You can also view calendar appointments by asking Cortana to show them. Emails can be created by saying to Cortana 'Create an email to Bob Smith'. Upon hearing this, Cortana will open your email app, create a new email, and add Bob's email address to the To box. This function requires you to use the Mail app in Windows 10, rather than web mail like Gmail in a browser, and Bob Smith's email address needs to be stored in the People app. You can also read emails with a command like "Show me emails from...." and name any contact in the People app.

You can turn wi-fi or Bluetooth on and off with a command like 'Turn on Bluetooth'. Get directions and maps with commands like 'How long will it take to get to London', or 'Show me a map of...' followed by the place. Music can be played and you can say things like 'Play music...' and specify an artist, album, track, or playlist. Cortana opens the Groove Music app, searches through your library for the specified music and then begins to play it. conveniently, Cortana also understands pause and stop commands, so you can easily control the music – providing it can still hear you, that is!

## Apple Siri

You might think that Apple invented the core concept of the digital personal assistant when it incorporated one into the iPhone 4 five years ago, but Siri was originally just an app in the iOS App Store. Apple saw it and liked it so much, it bought it. The original developer had plans to create versions for other mobile operating systems like Android, but those were scuppered when Apple took over the reins and lined his pockets.

“ Siri was originally just an app in the iOS App Store. Apple saw it and liked it so much, it bought it ”

Google Now works on everything, Microsoft has versions of Cortana for non-Windows platforms (although, as we've discussed, they're not widely available), but Siri is available only on Apple devices. This digital personal assistant has been on the iPhone and iPad for half a decade now, but was only recently added to Apple Macs with the latest release of macOS. However, it is now integrated into the firm's desktop OS in a similar way to Microsoft's Cortana.

The lack of Windows and Android versions of Siri limits the number of people that have access to it, but plenty of Windows users have iPhones and iPads, and they will be familiar with Apple's digital personal assistant. Instead of being a separate app, Siri is built into iOS and holding down the home button on the iPhone, iPad or iPod Touch activates it.





tasks can be carried out using the voice interface and using fairly natural language.

Siri, like all digital assistants, can be quite dumb at times. It can also be very clever in some circumstances, though. For example, ask Siri to 'Find beach photos', and it will open the Photos app and display all photos taken on or of beaches. You could also, for example, ask it to display all your cat photos; in fact, you could request it to filter by any of 4,000 or so objects it can recognise as appearing in your photographs (actually, to be fair, it's the Photos app that can recognise objects and scenes in images, Siri just asks it nicely).

If you want to search the web, you can say 'Google...' followed by the subject. Siri opens the Safari browser and displays results from the Google search.

## Other Digital Personal Assistants

Google, Microsoft and Apple are not the only companies creating digital personal assistants and Amazon has Alexa, which is built into some of its products. For example, there has been a lot of praise for the Amazon Echo multimedia speaker that has voice control. You can speak commands and ask questions from across the room, even while it is playing music. Say things like 'Wake me up at 7am' or 'What's the weather like in London', and many other commands and requests for information.

Alexa is intelligent, but the speaker does not have a screen,

“ The new Amazon Fire TV Stick also has Alexa built in and there is a microphone in the remote control ”

so the information it provides is spoken. The voice interface is its main interface, although there is a mobile app that can be used to display information or to access certain features. Alexa inside the speaker can be very useful when you want to get news, traffic, weather and sports news. It is possible to connect to other devices in the home from WeMo, Philips Hue, Hive, Netatmo and others, so you can turn down the lights for example.

The new Amazon Fire TV Stick also has Alexa built in and there is a microphone in the remote control. This enables you to perform searches for movies and TV shows without having to fiddle with the buttons on the remote. It can also be used to interact with some other companies – for example you can order a pizza or a taxi. [mm](#)

▲ Amazon's digital personal assistant is built into the Echo speaker and other devices

The one feature that stands out the most with Siri is the genuine attempt to give it a personality. It can actually be funny and entertaining thanks to those doing the programming. Cortana can be fun too, at times, but there doesn't seem to be a lot of personality in Google Now, which just gets on with the job. There are hundreds of amusing things you can say to Siri – like: 'Will you marry me?'; 'When will the world end?'; 'Is there a Santa Claus?'; 'May the force be with you!'; 'Blah blah blah' – to illicit an amusingly dry response. In fact, we've listed 10 of our personal favourites in the box out at the end of this article, look...

Apple clearly wants Siri to be entertaining, but it does have many serious uses alongside the funny responses. You can call people by telling Siri who you want to speak to, for example, and no number is necessary if the person is a known contact. Siri can post status updates to Facebook and Twitter – you just need to say 'Post to Facebook', upon which you are asked what you want to post and can just dictate a message.

Siri can interact with most Apple apps on the iPhone, iPad, and Mac. Calendar, Notes, Reminders, Clock, Contacts, iTunes, and Maps are all supported, for example. This enables you to set alarms and timers, create appointments in the calendar and reminders for later, store notes, play music, or view maps and get directions based on your current location. You can also access some settings, control Bluetooth and wi-fi, or you can turn on Do Not Disturb mode. Of course, all of these various

### 10 Funny Things To Ask Siri

1. Will you beatbox for me?
2. What is the best operating system?
3. What is 0 divided by 0?
4. What is your favourite movie?
5. Tell me your story
6. OK Google
7. I'm naked
8. Which came first, the chicken or the egg?
9. Why are fire trucks red?
10. What is your favourite song?

# Retro Gaming News

## New Amstrad game *Outlaws* comes from Retrobytes. It may have won the \$300 prize at #CPCRetroDev 2016, but Dave Edwards isn't impressed at all...

**D**on't you just love those movies where the hero must kill at least 14,000 people before the credits roll? *Outlaws* is a game of that sort. Its hero is Daniel Colt, who has just returned to his wild west homestead to find it now sports more bad guys than a game of *Operation Wolf*. Colt is less than ambivalent about killing anyone and everyone he sees, which is fortunate, because everyone feels exactly the same way about him. Cue thunderous roar of gunfire from both hero and enemies throughout each level. There are nine in total plus a practice level and two bonus ones.

The game plays in full-colour with the action taking up the top two-thirds of the screen and a large status field occupying the rest. You can imagine the action area as four rows: Colt runs left and right along the bottom one, one or more enemies do likewise on the other three, shooting down towards him.

To pick off enemies, you move a crosshair around the entire area and try to position it to take out each enemy with a single shot. Some enemies are more dangerous than others. When those on the row directly above him shoot, their bullets have less distance to travel, whereas bullets from enemies on the top row are visible for much longer.

Each level features the same 'four row' style, but the backdrops change, as do the 'foreground' items. These include barrels, cacti and stones – all items which you can choose to shoot if you wish (Most of them will explode after three direct hits). Occasionally, they can grant the enemies some cover, and so you're recommended to take them out to make killing the enemies themselves easier. However, I didn't find this helped, as I'll explain below.

*Outlaws* is a game of total pandemonium. Firstly, there can be up to eight bad guys running back and forth, loosing off bullets towards the bottom of the screen. You need to strike a balance between

getting Colt out of the way of these whilst also lining up the crosshair with any enemy you want to kill. An enemy stands still to fire at you, but not for long – hence, for the vast majority of the time he's a moving target. It's difficult to hit him because the crosshair doesn't move smoothly. Instead it jerks around, frequently going one place further than you would like.

Control of the crosshair also requires practice. Essentially, if you hold down the fire key and move in any direction, the sight alone moves, and Colt remains where he is. But if you do not hold down fire, Colt runs left or right and the crosshair moves with him.

This therefore means that by far the most effective strategy to clear a level is to forget moving the crosshair back and forth and forget blasting away the bad guys' hiding places. Simply position the crosshair in the dead-centre of the playing area and then tap the fire button when a running bad guy gets about eight pixels away from it.

The trouble is that this is not a strategy the authors intended you to pursue. There are other criticisms too. For instance, there are 'window baddies'; bad guys who sit in the windows of buildings firing at you. These are the one type of bad guy that you must move over to, and the ones that are much more likely to lead to your demise – because in concentrating so hard in getting the crosshair perfectly aligned with their position, you won't see other bullets streaking towards you!

The pandemonium of *Outlaws* results from too much going on on-screen for your eye to track – combined with the cramped, small action area. And if you thought this combination resulted in a tough level one and two, level three is just a horrifying mess of blocks which, were it not for the symmetry, might actually lead you to think the game had crashed! Picking out your circular orange crosshair against a stony orange backdrop is like walking through a raging battlefield whilst playing *Spot The Ball*. Needless to say, I've never got any further than this. Considering when you die you get sent all the way back to the beginning, I doubt many players will.

Is there anything good about *Outlaws* then? Well, yes, it's superbly presented with a big, bold loading screen, and good graphics – although you will have to pause the game to stand much chance of actually appreciating them. The changing backdrops do introduce variety and, if you persevere with it, the instructions indicate there are bonus levels to look forward to.

My own opinion is that there's a point at which healthy frustration over a game bubbles over into downright contempt for it. *Outlaws* has the right ingredients for a masterful shooter but it's too chaotic for me personally to persevere with. [mm](#)

### Scores

**Graphics: 84%**

**Sound: 15%**

**Playability: 66%**

**Lastability: 30%**

**Overall: 49%**



▲ It's crashed! Oh no, it's meant to look like that. Right.



# Remembering...

## 180

### We take to oche this week, and develop our beer-bellies

Of the many real-world games that found their way into a digital format in the 80s, the champion of the working man's club wouldn't be high on the list in most people's minds. Indeed, the noble game of darts never really played out too well when it came to the conversion from real life to the computer screen; but there was an exception.

*180*, from Mastertronic, was a superbly masterful combination of big, over-colourful graphics (although still monochromatic on the Spectrum), quirky characters, disembodied hands, and dogs relieving themselves against the bar. It was that odd humour that endeared many a gamer of the day to this £3 title back in 1986; that, and the fact that if you manage to place all your darts in multiples of treble twenty then you're assaulted by some half-crazed digitised speech belting out the legendary "oneehundredandeightee!".

Basically, you play as an up-and-coming darts champion, who must battle their way through the ranks of other darts masters until they can take on the ultimate darts warrior himself, Jammy Jim. With names such as Delboy Des, Devious Dave and Limp Wrist Larry you could be forgiven for thinking this an easy task. Naturally, though, you're dead wrong. The players become progressively harder as you move your way up the rankings challenging the other contenders of this popular indoor sport; with the final against Jammy Jim, a player who is near perfect with every throw.

Graphically, *180* was really good. It was played out through two separate elements. The aiming and throwing part of the game, the part where you control your disembodied hand, is excellent and well designed to make it both accurate yet also challenging enough to keep you playing despite its limited monochromatic appearance. The second part involved you watching your opponent throwing, where you got a view of the comic-like character along with a section of the bar complete with barmaid pulling pints, a somewhat obese punter downing them, and the aforementioned dog, who occasionally appears, walks up to the bar and proceeds to cock his leg against the corner amid terrible and garish colour clashes.

Odd humour, equally odd opponents and some interesting graphical interludes make for an exceptional game of electronic darts.

### History

*180* was developed by Binary Design Ltd, which was made up of Garry Hughes, Ste Pickford, Jeremy Nelson and David Whittaker. In this instance, though, it was Ste Pickford and David Whittaker who brought us this rather unique game.

It was released on Mastertronic's MAD label, for the Spectrum 48k, 128k, C64, Amstrad CPC, Atari XL/XE and the MSX, and sold, as mentioned, for £3.

This was Ste Pickford's first project for Binary Design Ltd, having started that morning with the company at the age of 16. The remit for the game was simple enough:

### Did You Know?

- Both Ste and Jez had never even been in a pub when they developed *180*
- Andrew Routledge was the C64 programmer, Dave Forward the Atari XL programmer, and Steve Hughes the MSX programmer
- It took three days for Pickford to draw in the hand animation
- Binary Design, and the Pickford brothers, also worked on *Fued*, *Amaurote*, *Glider Rider*, *Hard Drivin'*, *Double Dragon*, *Zub* and many more

to come up with a darts game that was different from what was currently available.

To make *180* a little different, Pickford used his brother's, John, animated sprite editor to draw his own hand in a throwing motion as the model of the in-game hand of the player. The pub background and animation was drawn by another new starter, Jez Nelson, who was an ex-Teletext artist.

The game was very successful indeed, selling well over 60,000-plus copies for the Spectrum alone and paved the way for the company to release further excellent titles in the years to come.

### The Good

Great graphics, humour, and the chance to see a dog do a wee against a bar.

### The Bad

Extremely tricky in the later levels. [mm](#)



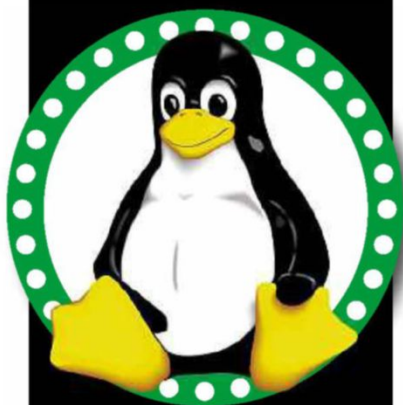
▲ "Oneehundredandeightee" – *180*'s loading screen on the Spectrum



▲ The eye-catching hand animation of *180*, courtesy of Ste Pickford



▲ The infamous dog scene, and garish colour clash barmaid



David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

# Linux

# A Heavy Blow To Linux Gaming

## Did Windows 10 kill the Steam Machine?

A few years ago, the gaming landscape was shaken with the announcement of Valve's SteamOS and its accompanying PCs, the Steam Machines.

Gabe Newell's hatred for Windows 8 was splashed across the front pages of virtually every online news site and magazine; he didn't like it at all. He was concerned that Microsoft was moving away from having its operating system as a gaming platform, so Newell decided that it was time to send a little love over to the Linux community.

The result was, of course, SteamOS, a Debian-based distro with a customised desktop and client side to gain access to Steam's ever growing library. It didn't stop with the OS side of things, though, Valve announced the Steam Machines themselves and the Steam Controller, both of which were supposed to put the wind up the consoles and become the new name in living room gaming and entertainment.

Things didn't quite work out the way Valve or those who got behind the Steam Machines wanted them to, however. But why?

### Not So Steamy

There are a number of reasons why: the Steam Machines were hugely overpriced, the Steam Controller wasn't all that good, the library of Steam titles didn't expand as fast as Valve hoped, and the developers and studios didn't get on board either. And let's face it, SteamOS was a bit rubbish.

While all these combined to make the whole 'Linux is the future of gaming' a little less promising, the real reason why the entire concept failed has recently been accredited to the launch of Windows 10.

Frank Azor, co-founder of Alienware, spoke to PC Gamer in an interview regarding the company's line-up of gaming hardware, and the subject of the ALienware Steam Machines came up.

"The catalyst for the Steam Machine initiative was really around what Microsoft's decisions were with Windows 8, and if you remember that operating system, it really stepped away from gamers in a big way. We were concerned as an industry that we were going to lose PC gamers on the Windows platform to any other platform that was out there," said Azor. But while Valve and manufacturers like Alienware were busy trying to re-engage the PC gaming market, Microsoft went and dropped Windows 10 into everyone's lap.

Azor continued, mentioning that delays in the OS and Steam Controller meant that by the time the entire systems were ready for launch, Windows 10 was already a far better platform

for gamers than the previous version of the OS.

The need, therefore, for a Linux-based gaming platform quickly passed. And due to the high cost of the machines, the controller and the somewhat lacklustre SteamOS, gamers found that their current PC worked perfectly well with a free Windows 10 upgrade.

Furthermore, the advent of VR has proved to be a final nail in the Steam Machine/SteamOS platform, as the likes of the HTC Vive and Oculus Rift are favoured more by Windows gamers in a living room setting than any other platform at present – to add to that, Linux support for the Vive is still very flakey.

While it's easy to blame Microsoft, I think the main culprit is really SteamOS. Here was a distro that was unstable and used a graphics API that performed staggeringly worse on virtually every title compared to Windows. It's little wonder the project failed before it even really got started.

Either way, I'd like to know your thoughts on the matter. Write in and let us know. Until next week, folks.

▼ *While a commendable idea, the Steam Machine failed for a number of reasons*





# Kickstarting

**Sven Harvey looks at more Amiga-related crowdfunding**

**B**ack in 1991, Image Works (part of the old Mirrorsoft group) released a game developed by a team headed by Mevlut Dinc and Raffaele Cecco known as Vivid Image. These former System 3 team members had already released Hammerfist and Time Machine, but it was *First Samurai* that really caught the public and critic's attention. The review scores for the platform game were all very high, which considering the game's format, was high praise indeed, with so many games of the type around at the time.

Once again as is often the case with Amiga titles the music (by Nick Jones) and sound effects that you'll remember with an incredibly memorable reversed cymbal in the music, with the main theme staying with you for 25 years without a problem. Mind you the 'Hallelujah!' sound effect when you opened the treasure chests will really take you back!

The graphical style from artist Teoman Irmak always had an eye catching style and with the collapse of Mirrorsoft it wasn't a huge surprise that the follow-up, *Second Samurai* would end up being published by Psygnosis, and it seemed to fit that particular publisher like a glove. Brian Marshall took over musician duties with assistance for Mev and Raff, with Teoman Irmak getting further artistry assistance from Sauray Sarkar. *Second Samurai* was released in 1993 on the earlier original chipset and ECS Amigas, while an A1200 version followed in early 1994 just before Commodore collapsed. Unfortunately, the planned CD32 version never got released.

Fast forward to 2016, and we find Mev and Raff heading up a new studio, Pixel Age Studios, and developing the third Samurai game. Though primarily a remake of *First Samurai*, the new game will be coming to the PC and hopefully the PS4 and XB1 in the form of *Super Samurai: Temples of Time*. Alongside the original designers and coders, Allister Brimble is on board as musician. A new set of artists are on board including Bill Harbison, (who worked on *Batman: The Movie* from Ocean as well as *Chase HQ* and *Runescape*) Ozan Civit, (illustrator, concept artist

and head writer and producer on one of Turkey's highest rated animated series) and Umut Findik who is transforming Ozan's designs into the new 3D environments and characters in *Super Samurai*.

The Kickstarter to get the project off the ground has an initial target of £90,000, with a stretch goal of £110,000 to get the console versions going.

You can check out the Kickstarter campaign at [goo.gl/Ft2z5p](https://www.kickstarter.com/projects/googl/Ft2z5p).

Oh and if you need reminding of the music – there are three remixes from the first game at [goo.gl/iQOLji](https://www.kickstarter.com/projects/googl/iQOLji).



## **A1200.net**

With users looking to relocate their Amiga 1200s into new non-yellowing cases, it makes sense that the keycaps on the keyboard need the same treatment. Just like the cases themselves, the chemical components in the plastic of the keycaps on original Amiga machines yellow with ultra violet exposure until they look like they have spent 20 years in a smoking shelter.

Following on from the Kickstarter for the replacement cases from A1200.net, the same team are offering full sets of replacement keycaps for original Amiga keyboards.

The rewards include various choices of keycap colours with bundles of more than one set and various other bundled items available. The stretch goals include various non-English key cap printing sets, though nothing more than that. You can find out more on the Kickstarter campaign at: [goo.gl/Y7ozh5](https://www.kickstarter.com/projects/googl/Y7ozh5).

Be aware that the project leader has relocated from Europe to Singapore, hence the currency the Kickstarter is in.



Sven Harvey has been our Amiga specialist for over 17 years drawing on his 25 years retailing computer and videogames and nearly 30 years writing about them!

# Amiga



Ian McGurran is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

# Mobile

# Retro Fun

**Ian McGurran looks at some of the old PC games now popping up on mobiles**

**E**ven before the modern, Steam-driven era, the humble PC has been home to a huge amount of classic games over the years, from action, adventure, real-time strategy and more. However, though PCs are still much the same devices as they were in say, 2000, things have moved on so much that many of these classic games can no longer be installed and run on a modern PC easily. Sometimes it's incompatibility with newer operating systems; other times it's broken copy protection. But not to fear, as many of these games are finding a second wind on phones and tablets. Let's check out some of the favourites.

## Rome: Total War

One of the latest to be reborn on tablets, *Rome: Total War* originally appeared on the PC way back in 2004, and it was one of the first turn-based strategy games that really brought stellar graphics to the table too. Highly reviewed at the time, and leading on from the original *Shogun: Total War*, *Rome: Total War* is, not surprisingly, set during the campaigns of the Roman Empire. The iOS version, for better or worse, doesn't skimp on the depth that made the original so warmly remembered, though for some the touch interface doesn't hold up to the original's mouse driven one. Still, you get the full unabridged game here, and for £7.99, that isn't bad at all.

## Star Wars: Knights of the Old Republic

There was a time when most *Star Wars* games were as highly anticipated (and as warmly received) as *Sonic the Hedgehog* games are now. But in the early 2000s, Bioware showed that a proto-Mass Effect RPG could be played in the *Star Wars* universe and be one of the best *Star Wars* games ever made. Importantly, *KOTOR* (as it was known) was a great game regardless of the setting, but the setting made it even better. Like *Rome: Total War*, nothing is lost in the translation to mobile, though similarly nothing beside a bump in resolution is gained either. That said, the game still stands up and really draws you into the world it lets you create. Since *Star Wars 1313* was cancelled, *KOTOR* is still the best *Star Wars* RPG.

## Myst / Riven

Finally, it's the games that were a love / hate affair for many, and arguably one of the

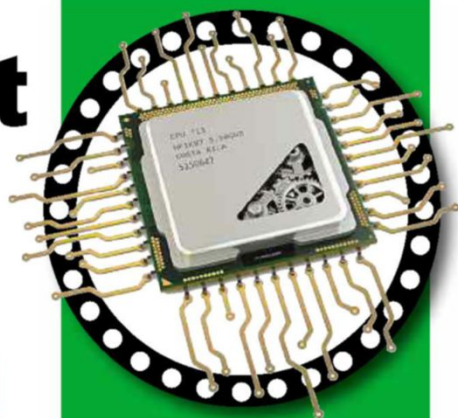
few PC games of the 1990s that broke through into the mainstream. Showing off the power of the new CD-ROM format and higher-resolution graphics cards, *Myst* was a series of rendered images of a fantasy world, interlinked by odd puzzles. At the time it looked amazing, though now it's clear it was little more than a fancy slideshow. The remake is actually in full 3D so doesn't really count, but the sequel, *Riven*, is available in all its static screen glory. Slightly unfairly lambasted at the time, it is certainly a curio now, if only to evoke a certain time in the mid 1990s.

Though the mobile platforms are home to many remakes of older games, it's certainly interesting to sometimes play the real code themselves and lose a few hours wallowing in nostalgia. Sometimes you might be lucky enough to find that the experience is now better than before and the gameplay still stands up.





# Has The Cat's Thirst Been Quenched?



**Andrew Unsworth's ears prick up at the sound of an approaching Jaguar, which is a mean feat given that it's silent**

I must admit that I'm a bit of a Jaguar fanboy, although perhaps I should explain that statement considering that in this polarised, social media-led world a simple preference for something can be interpreted as meaning you despise all else. I'm not tribal enough to claim that a Jag will suit all needs, but the cars in the current range do have a charm that very few other cars I've driven have possessed.

I am therefore very excited by news of the Jaguar I-Pace ([www.jaguar.co.uk](http://www.jaguar.co.uk)), which is the company's first all-electric car. Although it's officially a concept car, it will go into production and is set for release in the latter half of 2018. That might seem like a long way off, but it isn't. It's just a year and a half, which will fly by in a caffeine-fuelled fug of rushing to meet work deadlines and deferring happiness from one payday to the next. In what seems like five minutes, we'll all be able to marvel at them in showrooms up and down the land, building up courage to book a test drive, even though we don't have somewhere to charge one up.

So what are the tech specs? The I-Pace's two electric motors can apparently produce 700nm of torque and 400 pferderstarkes (PS), which

propels the I-Pace from zero to 60 miles per hour in just four seconds. That's supercar fast. It's also practical, on account of it having five seats and a proper boot, so there's no need to compromise on space or comfort.

Range is an important factor in choosing an electric motor, and the Jaguar I-Pace's claimed maximum range is an impressive 310 miles. That's enough to get me from the centre of our nation's fair capital to Windermere with some range to spare, assuming there are no battery-draining traffic jams. Jaguar says the I-Pace will recharge to 90% of maximum capacity in 90 minutes.

Recharging an electric car isn't as quick as refuelling a petrol- or diesel-powered car, but when electric charging becomes more common, and more car parks have recharge stations, refuelling electric cars such as the I-Pace shouldn't be that much of a bother. We'll just charge up our motors when we get to work and unplug them in our breaks. Plus, I'm sure recharging speeds will improve in the next few years as demand and competition increases.

I must admit that I've been impressed by all the all-electric and hybrid motors I've driven, and I think this is a pretty

exciting time to be a tech-loving car enthusiast. For me, this is mostly because the ones I've driven have provided sport in the form of batteries to recharge while on the move (or, in the case of the petrol-powered SkyActiv Mazda 3, a capacitor). The Porsche Panamera S E-Hybrid, for example, has a screen that shows the current charge of its batteries, and the flow of charge from them and into them. It can charge the batteries from activities such as braking and coasting, which meant that I spent my journeys trying to top up the charge as if it would unlock some achievement at the end of them. It's actually pretty addictive.

I know this is a bit of a departure from strictly computer hardware, but to be fair, I see this as further convergence of technology from the strictly mechanical to the electronic and computerised. Technology and initiatives such as Nvidia's Drive CX and Drive PX are proof of this. Thanks to automation, before a trip in the car will be extra time on the computer. Do I play Battlefield BC: The Walls of Jericho (Out of the Wilderness Collector's Edition) on the way to work or do I make some noise with Ableton Live 9.9? Exciting automotive times are ahead of us.

Andrew Unsworth has been writing about technology for several years, he's handy with a spanner and his handshaking skills are second to none

# Hardware





Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*



## Mass Exodus

New characters, new game mechanics and a whole new galaxy await us in BioWare's eagerly-awaited *Mass Effect: Andromeda*, which sets sail next year

**This week, Ryan takes a look at next year's *Mass Effect: Andromeda*, and checks out what's on the horizon for *Rainbow Six: Siege*...**

### Plug & Play

To paraphrase Christopher Walken's mobster villain in the movie *True Romance*, cinematic videogame trailers have a tendency to show us everything and tell us nothing. Sure, the graphics are pretty and the music's soaring, but they seldom give us much substance to chew on. The slick new trailer for BioWare's *Mass Effect: Andromeda* is a little bit different, though. That's because, firstly, it's from a series where story and setting are a major part of the experience, and secondly, because *Andromeda*'s billed as a fairly major departure from the three games that preceded it. *Andromeda* is, to use a term from the movies again, a 'soft reboot': it's still an action RPG, but the characters, plot and even a few of the mechanics are different.

To separate the new *Mass Effect* from the old, BioWare are moving the plot to a new galaxy – the *Andromeda* of the title. The player takes the role of either Sara or Scott Ryder, two humans who form part of a mission to find a new home for humanity. The explorers' trip into *Andromeda* soon goes awry,

however, and either Scott or Sarah (depending on who we've chosen as our protagonist) are ejected from their ailing ship. Waking up on a hostile planet, the first task is to survive in an unfamiliar world; the second is to colonise it, and to find other planets where humans can inhabit. Needless to say, there are plenty of other alien races who aren't too pleased about all this.

While there are plenty of elements in common with prior *Mass Effect* games – the branching stories, the dialogue wheels – *Andromeda* also introduces some quite fundamental changes. The open-world setting is a first for the series, while BioWare's also doing away with the old Paragon/Renegade class system – instead, we'll be able to choose skills as we progress.

In other respects, *Andromeda* is the same old *Mass Effect* – indeed, the word is that, for all focus on freedom over linearity, it's close in spirit to the first game from all those years ago. For those who thought *Mass Effect 3* had lost some of the complexity of the previous two games, *Andromeda* could prove to be something of a return to

form. There was a sense that, with the third game in the series, one of its most ingenious aspects – players' choices from previous games affecting events in the next – had become something of a millstone. With *Andromeda* providing a clean break with the past, BioWare is, like the pioneers in the game, free to build an entire new galaxy of possibilities.

*Mass Effect: Andromeda* is due for release in spring 2017.

### Online

These days, most of us are familiar with the idea that games are as much a service as a product. Developers can keep creating maps and new missions to keep us amused for months and even years after a game's initial release; the only downside is that, when those updates stop coming, the sensation can often feel like a great TV show cut off in its prime. For those of you who've been enjoying *Rainbow Six Siege*, there's good news: Ubisoft's pledged to keep supporting the game for at least a year.

Ubisoft's currently working on *Siege*'s fifth content update, called *Operation Red Crow*: this takes place in Japan,





▲ The fifth and final chapter in *Rainbow Six Siege*'s current season is out soon, but fear not: Ubisoft's confirmed that it has another year of content planned

introduces two tough new operatives, and will offer players the challenge of planning and executing a close-quarters mission within the confines of a luxurious skyscraper.

"You are mobilised to neutralise an organised crime threat within a Yakuza-filled mansion high above the streets of Nagoya," Ubisoft recently explained. "There is a faction within the Higasiyama-gumi that rebels against their leader, which triggers terrible violence."

There was some concern that this update might be *Siege*'s last, since it's the fifth chapter in the season, with nothing officially confirmed beyond it. On the November 13th, though, Ubisoft took to Twitter to formally announce that a second season is now in the works.

"The past year has been an incredible journey," the developer's tweet reads, "and we are excited to have you join us for another full year of content!"

We don't yet know whether Ubisoft will follow the same format as the current season, with new maps and operatives in

each update, or whether they'll keep offering these updates for free as they have in the past, but here's hoping the team carries on introducing new features and ideas to keep the game fresh. The forthcoming *Red Crow* is set to bring in a new system in which guns make different sized holes in things depending on their calibre: "stronger calibres will create bigger bullet holes and generate larger impulses" a recent update explains. It might sound like a minor detail on paper, but with the use of terrain as cover being such an important part of *Siege*'s pleasingly deep tactics, having walls suddenly perforated by gunfire is certain to change the complexion of a firefight within a split second.

*Operation Red Crow* is out on November 24th.

## Incoming

Exactly why Gearbox Software chose to release its online shooter *Battleborn* in the same month as Blizzard's all-conquering *Overwatch* isn't clear, though in Gearbox's defence, even Blizzard probably

wasn't expecting its first foray into the genre to be quite such a storming success. At any rate, *Battleborn*'s been somewhat overlooked since its launch in May, with its plummeting player count often making the news over the past few months. While *Battleborn* may be struggling, the players who've fully engaged with it are vocal in their support – and Gearbox, pleasingly, isn't giving up on the game yet. Mid-November saw the launch of new DLC, which added a story mission and a few extra skins and other unlocks. Gearbox has also announced that it has a new playable

character on the way; called Beatrix, a one-armed cyborg who specialises in spreading disease among rival players.

*Battleborn* may not be perfect, but it has a sense of humour that's difficult to dislike; that recent content update sees players fighting to reclaim a stolen mech suit belonging to a penguin named Toby. We don't yet know whether the rumours that *Battleborn* is going free-to-play are true, but with the developer and the game's loyal fans recently going on a recruitment drive to recruit more players, it looks as though the shooter will keep going for a good while yet. [mm](#)



▲ Beatrix, a one-armed, disease-spreading cyborg is a new character planned for Gearbox's endearingly strange online shooter, *Battleborn*



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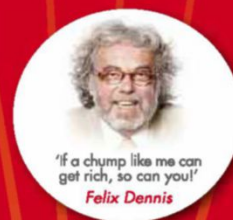
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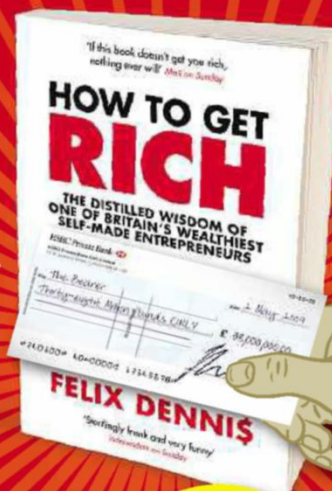
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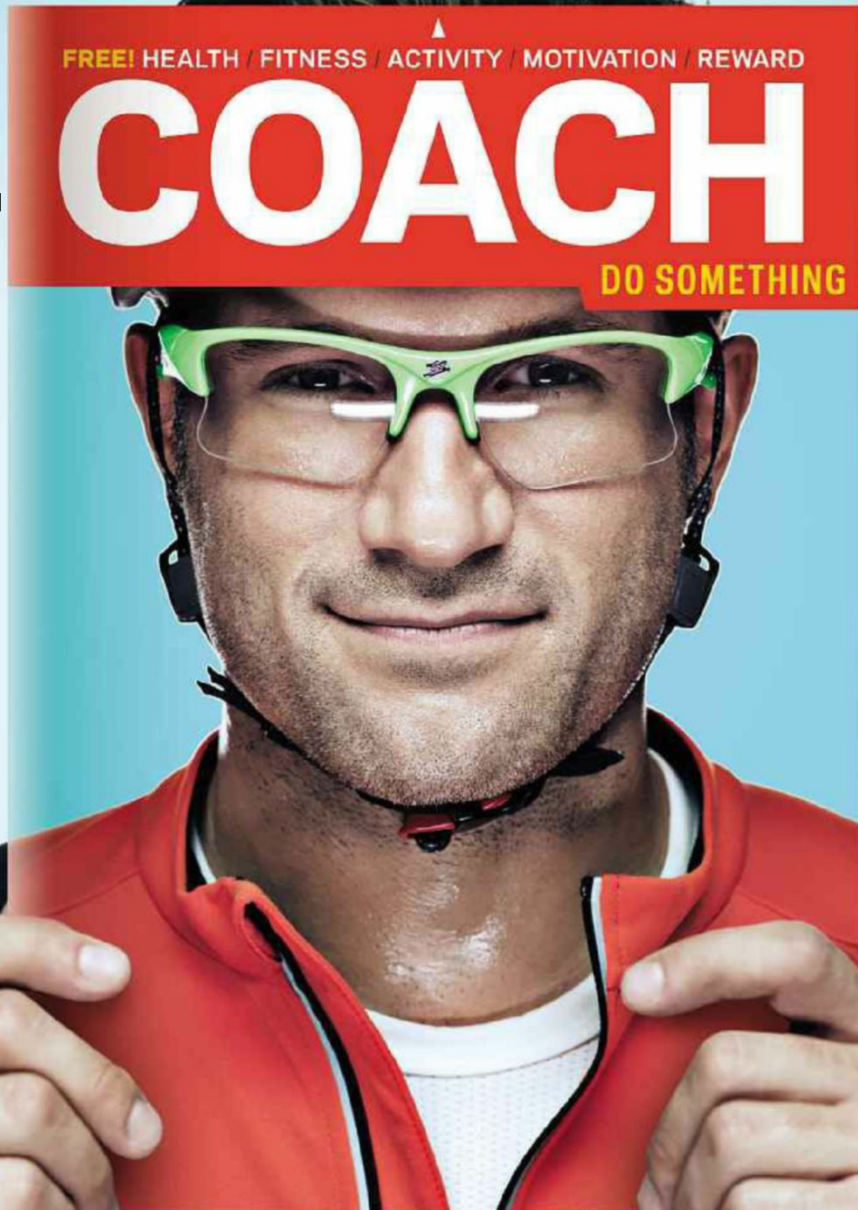
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## SOFTWARE FOR SALE

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Email: [madproff@mail.com](mailto:madproff@mail.com)

## SOFTWARE WANTED

**Good Text to Speech program** WinXP or 7 to read ebooks aloud for a pensioner with few resources. Tel: Wilf James (01767) 699809

**Wanted: PictureToExe** software, for making picture shows.  
Tel: (01202) 610602  
Email: [ivor.mary@talktalk.net](mailto:ivor.mary@talktalk.net)

**Wanted: Quicken 2001.** I desperately require a copy of QUICKEN 2001, UK Edition. I need to reinstall the program, but have lost my original installation CD.  
Email: [david.maddams@icloud.com](mailto:david.maddams@icloud.com)

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- Keep copies of all correspondence
- When sending out goods, at the least obtain a certificate of posting from the Post Office

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Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

*Aaron*

## Massive MP3?

I have a collection of audio files that I need to burn to disc so a relative can listen to them on their CD player. As far as I know, the CD player is quite old, and so it won't support DVDs or up to date things like MP3s. I know, amazing, right?

The files I have are MP3s, and I've got around 700MB of them, which if I'm correct should easily fit onto a CD-R. I have 800MB discs, so I didn't think there would be a problem. When I came to burn the disc, though, and when I selected to option to make an audio CD, I was told I'd need multiple CDs, not just one. In fact, I'd need a considerable amount.

I'm a bit confused about this, as the file size is only around 700MB, yet going from the software I'm using, it says the size is several GB.

Needless to say, I'm more than a little confused, and, although you may have already guessed I'm no expert, I'm perfectly able to count the size of files, and I know 700MB should fit onto a single disc. Why is this not the case, and what can I do about it?

**Kevin**

*The problem you've got here, Kevin, is the need to burn an actual audio disc. MP3 files are not standard audio files, but are instead highly compressed files. Audio CDs like the ones you buy in shops, or burn using computer software, utilise uncompressed CD audio files (.cda), which is the only format a standard CD player can read. These uncompressed files are much larger in terms of file size than MP3s. Whereas you can easily fit several hours of music onto a disc using MP3s, CD audio files of the same audio will take several discs as the audio is not compressed. This is why CD-Rs have a measurement in minutes as well as data capacity.*

**COMPACT  
disc  
DIGITAL AUDIO**

▲ Compact discs for use in standard audio players can only hold 74 or 80 minutes of uncompressed audio

*When you burn a disc using various software tools and select the option to create an audio CD, the software will actually uncompress the MP3s and convert them into CD audio files. This will increase the file size, and will prompt you to use several CDs.*

*Because standard CD readers, including older models, can only read normal audio discs, there's no way around this I'm afraid. It's a limit of the actual technology, so the only way to burn hours of audio is to use multiple CDs.*

*You could, using an audio editor, try to re-sample the audio at a lower quality, but this would still require multiple discs, and the quality of the audio would suffer. It also takes a lot of time and effort. For files that may be just a little bit too long to fit on a single CD, either 74 or 80 minutes, you can use burning software that features 'overburning' to get a little more capacity out of the disc. This can be hit and miss, but it's sometimes useful. In your situation, though, it's unlikely to make much difference.*

*This means the only way around this would be to use a more up-to-date CD player that can also read MP3 files, or use an MP3 player, or just stick to a computer.*





## McAfee Offline

I'm trying to fix the PC of a friend, but I'm having major problems. The main issue he has is not being able to get online at all, even though I've checked his connection (using my laptop), and all is okay. The problem is definitely not with his broadband.

I've looked at his system, and have tried turning off his firewalls, clearing junk files, reinstalling his browser (Firefox and Chrome), and more. Nothing seemed to work, however. I've also tried both wired and wi-fi, and have messed around with router settings giving him both static and dynamic IP. Basically, when I've had problems before, one or two of these tricks has always helped, but not this time it seems.

One thing I did notice was the lack of any antivirus software. I couldn't see any way to perform a scan, and Windows' own options were disabled, as if another program was installed, but it wasn't. I asked him about this and he said he should have McAfee installed, but he thinks he may have tried to remove this as he wanted to try another app, AVG.

He tells me that, when he tried this, AVG wouldn't install properly, as it gave some sort of error message. He can't remember what this said, though.

I really want to get this fixed is possible, as he's an older gentleman who struggles to get out and about, and the Internet I a great help to him. Thanks in advance.

*It sounds like you've covered all the bases in terms of common solutions and other possible culprits, so I'd certainly agree that the issue may lie with the security software on the system, most likely due to a damaged uninstall of McAfee. Without knowing the actual error message AVG throws up, it's hard to be 100% certain, but I suspect McAfee wasn't entirely removed, and left behind some data. This has been known to cause all sorts of problems with a variety of other security tools, including AVG.*

*Most security software doesn't coexist well with other programs of the same type, which is why we only use one antivirus scanner, or firewall at a time. If the software in question also had a firewall, this could explain the Internet connectivity problem.*

*This being the case, I'd recommend you visit McAfee's website and download the official McAfee Consumer Products Removal tool (MCPR). McAfee is aware of some issues its software has when being removed, both in the home and in a corporate environment, and has a tool that totally removes any trace of the software. You can get this from [intel.ly/2fNgf3e](http://intel.ly/2fNgf3e), and it's easy enough to use.*

*Once you do this, reboot and see if this step alone has solved the problem. When you do this, I'd also double check the Windows firewall, just to be sure. I'm fairly confident this will help with the issue, and once this is done you'll be able to install AVG as normal.*

▼ **McAfee has a powerful product removal tool to help fully delete its programs from a system if you're having issues**

**Lillian**

The screenshot shows the McAfee website for consumers. At the top, there's a navigation bar with links like 'Products', 'Virus Information', 'Security Advice', 'Support', and 'Free Trials'. Below this, a search bar is visible. The main content area features an article titled 'How to uninstall McAfee Windows security software using the Consumer Products Removal tool' with document ID TS101331. A summary states that the article describes how to use the McAfee Consumer Product Removal tool (MCPR) to completely remove McAfee Security Suite installations and data on supported Windows operating systems. A 'Virtual Assistant' section provides a link to guided steps: <http://www5.nohold.net/McAfeeEndUser/login.aspx?pid=3&login=1&ruleid=437>. A note indicates that clicking the link will open a new window. Below this, it says 'Alternatively, follow the Solution steps below.' The 'Solution' section starts with an 'IMPORTANT' note: 'If your McAfee products were pre-installed by your computer manufacturer, ensure that you activate your McAfee subscription to retain your entitlement before you attempt to remove it.' It then recommends uninstalling McAfee home user products using the Windows removal methods shown, or skipping to the 'Download and run the MCPR tool' section if that fails. The page ends with a section titled 'Recommended Windows removal methods:'.

# ASK JASON



**Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs**

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Contact Jason by email at:  
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While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

*Jason*

## Windows Shopping

In 2010 I bought a Medion Akoya PC from Aldi. I've attached a newspaper clipping for you, showing the specs. The PC's been great from day one, but of course it's getting old. Should I upgrade it – change the RAM or CPU, perhaps? Should I move to Windows 10? Or should I just buy a completely new PC? If a new PC is the best option, do you have any recommendations? I've emailed Medion ([www.medion.com](http://www.medion.com)) but not received a reply.

**Richard Battle, Gmail**

*Going by the advert, Richard, the vital statistics of your PC are as follows.*

**CPU:** Phenom II X4 820 (2.8GHz, quad-core)

**RAM:** 4GB DDR3

**GPU:** Radeon HD 5670 (1GB)

**HDD:** 1TB spinner

**ODD:** DVD rewriter

**OS:** Windows 7 Home Premium

*There's not much wrong there, to be honest. Yes, a PC from 2010 is closing in on retirement, but there are a good many Core 2 Duo PCs still in daily use that have been in existence for over a decade. Does the Akoya still meet your needs? It should be quite capable of handling office-type tasks, the web, and other day-to-day stuff – even some light gaming.*

*If light gaming isn't enough, you could swap out the graphics card easily enough. The motherboard has a x16 PCIe 2.x graphics slot, and a GeForce GTX 1050 (about £115) or 1050 Ti (about £140) wouldn't even necessitate a new PSU (neither requires a PCIe power connector). Your Phenom II X4 should just about cope – it's got at least as much grunt as a modern-day Pentium, and one of those is fine for budget gaming. 4GB of RAM is probably enough, too, though 8GB would be better.*

*If gaming isn't on the menu, I reckon the only change you'd really notice is the addition of an SSD. More performance would simply go untapped. Keep*

*your current 1TB spinner for your media files and so on and use the SSD for everything else. A 240GB unit would likely suffice (£60 upwards), but if the amount of data you've accumulated is fairly modest, a 480GB unit (£99 upwards) might be big enough to allow you to dispense with the 1TB spinner altogether.*

*As for Windows 10, I expect it would work just great on the hardware you've already got. There are still ways to upgrade for free. I'm not going to offer any links or advice (legally, it's a grey area), but Google is your friend. Is Windows 10 better than Windows 7? Yes. Is it worth worrying about if you're on Windows 7 and unable for some reason to upgrade? No.*

*Of course, maybe your needs mean that the Medion just doesn't cut it any more. Maybe it's starting to fail. Maybe you hope to start using Photoshop a lot. Maybe you want to play the latest games on high settings at greater than 1080p. If that's the case, Richard, I wouldn't mess about with an upgrade here, an upgrade there. Best to start from scratch.*

*What to go for? That's tricky. At the high-end, it can still make sense to self-build, but at the mid-range and below there's usually no price benefit in doing that – you may as well buy off the shelf. Zoostorm is a popular, well-respected UK brand ([www.zoostorm.com](http://www.zoostorm.com)), and Medion PCs are usually solid enough if the price is right. Naturally, there are other brands, including no end of smaller players (these mostly trade via Amazon and eBay, but don't let that put you off). You really do need to have a good browse online.*

*Note – I was going to suggest that if you opted to buy something new, you could sell the Akoya to offset some of the cost. It may not be worth the bother, however. Old towers tend to fetch no more than a few used fivers. I've got one here, similar spec to yours and with a half-decent screen in tow, that I've been unable to shift even at £30.*

▼ **Old towers don't tend to fetch much on the second-hand market**





## A Bit Of Trouble At The Office?

I subscribe to Microsoft Office 365, and I recently noticed that it's installed in 'Program Files (x86)', not 'Program Files'. This means I've got the 32-bit version, even though my Windows 10 installation is 64-bit. Surely I should have the 64-bit version? Can I update?

**N. Scott, Gmail**

By default, Office always installs as 32-bit, even when Windows is 64-bit. Your setup is therefore quite, quite normal. The 64-bit version is rarely of any benefit, and Microsoft continues to maintain that the 32-bit version is best unless there are special circumstances. You can read about the pros and cons of each version here: [goo.gl/cE0XaA](http://goo.gl/cE0XaA).

Your Office 365 licence allows you to go either 32-bit or 64-bit, and there's nothing to stop you from changing your mind at any point and swapping over (the same applies to users who've bought Office outright and have a standard product key). The link in the previous paragraph is the best place to



▲ The recommended version of Office isn't necessarily obvious

start, though I can tell you straight off that you'll need to uninstall your previous Office installation first. Personally, I'd just let things be.

## Two-Faced Technology

My Moto E (first-generation) has packed up, so I'm after a new phone. My budget is tight, and as I'm not afraid to go off-piste with my tech choices, I'm eyeing up the YotaPhone 2 ([goo.gl/oDgD70](http://goo.gl/oDgD70)). If you're not aware, this has a standard 5" 1080p AMOLED screen on the front and a 4.7" 960x540 electronic-ink screen on the back (I think this is some sort of clone technology, not actual E Ink). I like this idea very much, as I guess the back can be used like a Kindle.

What do you reckon? I think the phone cost over £500 when it launched, but it's available at [www.gearbest.com](http://www.gearbest.com) for around £110 now (imported from Hong Kong). Is the YotaPhone 2 worth a punt? Would the 4G work in the UK?

**Will, South Glamorgan**

It's an interesting phone, no question. And, yes, the 4G connectivity would work in the UK (as would 2G and 3G). In the UK, 4G/LTE uses bands 3 (1,800MHz), 7 (2,600MHz), and 20 (800MHz), all supported by the YotaPhone 2.

As you say, the e-paper screen uses similar technology to that found on the Kindles, so it's ideal for reading books that don't need colour. Such technology is also extremely power-efficient, pulling

from the battery only when a page is actually updated. Even on a device with a flat battery, an e-paper screen can still display an image.

Yota (a Russian company) claims the e-paper screen can be used for the full Android experience, and that's probably true. But, my word, Will, it would be a miserable experience. The refresh rate for this technology is best measured in seconds, not milliseconds, and the touch sensitivity is rubbish. For books, a clock, and news tickers, the YotaPhone 2's e-paper screen will be great. For everything else, you'd need to drop back to the AMOLED.

The phone launched back in 2014, but the core specs aren't bad. There's a 2.2GHz Snapdragon 801 SoC, 2GB of RAM, and 32GB of storage. No major features are missing. However, it runs Android 4.4.x (KitKat). I believe an update to 5.x (Lollipop) is available, but after a quick look I've not managed to track it down. Android 6.x (Marshmallow) and 7.x (Nougat) aren't ever going to be in play.

There's no YotaPhone 3, so this two-screen approach appears to have been abandoned – or else the company has run out of money (the YotaPhone 2 remains front-and-centre on the website's homepage). I'm not aware of any similar device from another manufacturer. That's

a shame, though I'm not sure how useful the e-paper screen would be in practice.

Is the phone worth a punt? Well, at £110, quite possibly – if you can find that update to Android 5.x. Just go into it with your eyes wide open, Will. I'd advise buying from a UK source if you can, as returning to Hong Kong in the event of a problem is likely to be fraught with difficulty. The best price I can find in the UK is £159.99, mind, and I reckon that's too much.

▼ The YotaPhone 2 – it's so two-faced



# Crowdfunding Corner

From pens to remote controls, everyday objects are getting a smart makeover in this week's instalment of Crowdfunding Corner...

## Sevenhugs Smart Remote

These days, it's not unusual to have several remote controls kicking around your lounge. If you've ever wanted to control everything in your home using just one remote control but find standard universal remotes bulky and inconvenient, well, this Kickstarter project might be the one you need.

The Sevenhugs Smart Remote allows you to control virtually any device just by pointing at it. The smart screen displays the relevant interface based on what piece of equipment you're trying to operate, so there are no extraneous buttons and no difficulty selecting the right mode for your controller. Just point and prod.

Of course, you *can* manually change the mode if your devices are too close together just by swiping left or right. Anything which uses wi-fi, Bluetooth or infra-red for its remote control can be added to the settings and there's even built-in support for apps. A lost and found button ensures you can find your remote wherever it's gone, as long as it has power.

The project has already proven super-popular and at time of writing it has hit nine times its original target of \$50,000 with 29 days still on the clock, so it's fair to say it's going to be big. By the time you read this the early bird pricing is likely to be done, but you can pledge \$199 (£160) for one which is still a third off the expected retail price of \$299 (£240).

**URL:** [kck.st/2f3N1Mk](http://kck.st/2f3N1Mk)

**Funding Ends:** Friday, December 16th 2016

## Mimoto Smart Pen 2.0

Mimoto's first smart pen was a hit on Kickstarter in 2014 and their new revised design, taking in feedback from their previous buyers, looks like it'll be a similar success. The pen allows you to write like a normal pen, but retains an instant digital copy of everything you write which you can sync to your preferred device. Apps are available for iOS, Android and Windows, and it's compatible with any Bluetooth device.

It's suitable for taking notes or drawing and can automatically store over 100 pages in its built-in memory. The Kickstarter package comes with the pen itself, plus a receiver, two USB cables, an ink refill, refill extractor and the user manual. The built-in battery charges over USB in 2 hours and retains 60 hours of note-taking life on a single charge.

The project is already well on the way to its goal and at time of writing there's a good chance you'll still be able to get some of the early bird tiers by the time this is in front of you. The minimum you can pay is \$75 (£60), but the retail price is \$130 (£104) and even the highest Kickstarter price is just \$95 (£76), so the chance of a decent discount is very high. The previous pen was well-liked by those who bought it, so don't miss out on this one!

**URL:** [kck.st/2fwG0cv](http://kck.st/2fwG0cv)

**Funding Ends:** Friday, December 30th 2016



- ⚙️ Patent-pending Point & Control Technology
- ☆ Connect via Wi-Fi, Bluetooth or infrared
- 🔗 Compatible with 25,000 devices
- 📱 Support services like Uber
- ♥️ Custom scenes & light grouping
- 🌞 High Definition touchscreen
- 🔍 Lost & Found button



*Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!*



# App Of The Week

## BeebEm

### Hands up who used a BBC Micro back in the day?

A recent conversation regarding my time in Computer Studies GCSE classes found me looking up an appropriate emulator for the rather wonderful BBC Micro. It brought back all sorts of memories of my youth and the classroom computers. Back in 1988, as a pupil of a small, northern school, we had just eight BBCs in the computer classroom; as well as a printer, the teacher's BBC and several assorted peripherals stored in the cupboard at the back of the room.

It's not many by today's standards, but each computer meant the world to those of us doing the GCSE, for which I coded my own database where I could enter membership details for my dad's working man's club. The Bees were also the main attraction of the lunchtime computer club, for which we ran gaming events and learned how to code in both BASIC and Assembly.

With this in mind, I thought it apt to cover the excellent BeebEm this week, as originally developed by Dave Gilbert and recently maintained by Mike Wyatt.

### Beep, Beeeep

BeebEm is an emulator designed to copy the exact functions, look and feel of the classic BBC Micro model B/B+ and Master 128 systems. In short, it's a wonderful bit of code that really brings the true 'feel' of the BBC Micro to the modern computer, right down to the simulated 'chug, chug' sound of the disk whirling away when loading a program.

The use of BeebEm is extremely simple, just download the latest version from [goo.gl/JPqXj3](http://goo.gl/JPqXj3) (currently 4.14, as we write), install and run. You'll soon be looking at a familiar black screen with white command prompt text. There, you can enter all sorts of the usual BASIC commands should you wish.

On the top of the emulator window you'll find a number of options that will allow you to change the machine from the standard Model B, to a B+, Master 128 and so on, as well as options to further enhance the machine with a second processor (Z80, ARM or 65C02)

### Features At A Glance

- Free
- Can accurately emulate Model B, B+, Master 128 and loads of peripherals as well
- Available for Linux, UNIX, Mac, Pocket PC and even the PSP
- Supports disk images and raw BBC Micro data files

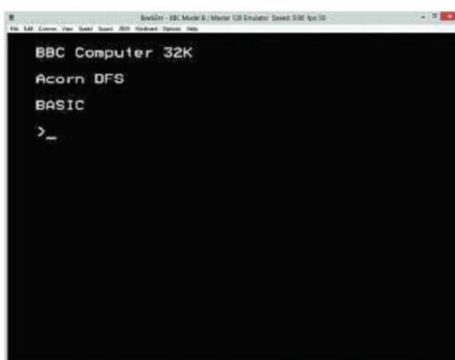
and alter the timings, display and sound to suit your purposes.

You can configure a joystick, include a hard drive, remap the keys, include a modem and even a Teletext adapter should you want to relive those heady days, or add the Econet networking upgrade. There's support for double-sided SSD disks, XAudio2 support and several TV resolutions to choose from – so, if you have a specific memory of using a Beeb with an old TV, you can get closer to recreating that original experience.

Although the gaming catalogue of the Beeb never matched that of the other 8-bit machines available at the time, you shouldn't have too many problems getting the likes of *Chuckie Egg*, *Elite* and *Repton* up and running in very little time at all.

### Conclusion

While it's not been worked on for a while, BeebEm is easily the next best thing to actually owning a true BBC micro. It's certainly enough to bring back some happy memories for me. Although you may not have too much call for it in this modern age, I'm sure you'll get some satisfaction out of reliving the familiar sounds and uses of the machine too. [mm](#)



▲ There's something strangely comforting about seeing the boot screen of a BBC Micro after so many years



▲ Aside from being a great programming and educational machine, the Beeb had a decent catalogue of games too

# Logging Off

**W**ith the realisation that a person who is heading to the Whitehouse who only previously become president in a Simpson's episode, there's been a concerted effort in the media to explain the utterly inexplicable.

One of their truth nuggets is that lots of Americans now get their news through Facebook, like that's a sensible thing to do. And during the campaign, plenty of 'news' was being shared on

Facebook that just wasn't accurate. Or, more precisely, had been intentionally fabricated by persons unknown for the purpose of undermining one side in this contest.

The amounts of 'fake news' (as the official media outlets labelled these stories) was substantial, and based on the result, it would seem reasonable to assume that some people believed a portion of it.

Humans have, it appears, a predilection for believing almost anything that fits their own prejudice. A when confronted with the facts that contradict them, they, as the winning candidate said in an interview on Fox News, will reply 'I just read it on the internet'!

I've read enough things on the internet that are either patently false or don't handle scrutiny well to realise that accepting a story as factual based on the volume level it's being transmitted at isn't without risk.

But what makes me slightly chuckle is that the news channels and broadsheet newspapers are pushing this as their justification for existing, like without them we'd hear no truth whatsoever. But that's an equally flawed argument, surely? Indeed, the number of times I put on a 24-hour news channel to be greeted by stories that patently aren't news is an increasingly common occurrence. If it's not the BBC promoting its latest natural history documentary, it's Sky talking about reality show contestants or bizarre famous-for-being-famous personalities. These stories aren't news, made up or otherwise.

I accept that having so much air-time to fill is a challenge, but dragging people off the street to talk about things of no real consequence isn't a substitute for journalism. And when they do cover an actual news story, it's coloured by all manner of things that are to do with how news is gathered rather than what the story justifies.

A prime example of this is when something catastrophic happens in a remote location, like an earthquake or volcano eruption. That's a

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significant story. Or rather it will be when they've got some footage and pictures of the devastation, because it's largely ignored until those items are available.

Depending on how dramatic those videos are will dictate how big a story it is, rather than how many people it affected or the far-reaching socio-political consequences of the event.

So before the BBC, Sky, CNN, the Times, the Guardian and all get on their high horses about fake news and what constitutes newsworthy content, they need to take a long hard look at themselves. They're not the sole guardians of truth, and they're now competing with channels that don't really care if what they're spouting is factual or not.

Oxford Dictionaries has declared 'Post-truth' as its word of the year, hinting at the distrust that many people now have for the established news outlets. Unless they start taking news more seriously than sending reporters to stand outside an empty parliament at night for no obvious good reason, then we've got a problem.

*Mark Pickavance*

## LAST WEEK'S CROSSWORD

**Across:** 7 Shooting Stars, 8 iTunes, 9 Orenda, 10 H G Wells, 12 Samba, 14 Drift, 16 Stinger, 19 Bosnia, 20 Planar, 22 Closed-Circuit.

**Down:** 1 Chit, 2 Bounce, 3 Fissile, 4 Igloo, 5 Athena, 6 Credible, 11 Gargoyle, 13 Stop Bit, 15 Finish, 17 Nuance, 18 Panda, 21 Aria.

### DISCLAIMER

The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. There are five million fake news stories appearing on social network every two seconds, and 37% of them are about how many fake news stories there are on social networks. An amazing fact for sure. But it's not true, of course. It is, indeed, another fake news story. With so many untruths floating around, though, it's difficult to know

exactly what you should trust. For that reason, we've now made it our policy to believe nothing we see in the news. Donald Trump is the US president, you say? Poppycock. Why would any developed country elect a completely unqualified businessman as their head of state? The value of the pound has dropped? No way. Ours are still worth a pound, and they're staying like that. Andy Murray is the world number one tennis player? Sure he is. Did every other player die in some freak accident? You get the idea. The only real question is how far we should take this. We're thinking maybe as far back as the 1960s, when our clothes would have been fashionable, and using the word 'groovy' was actually groovy.

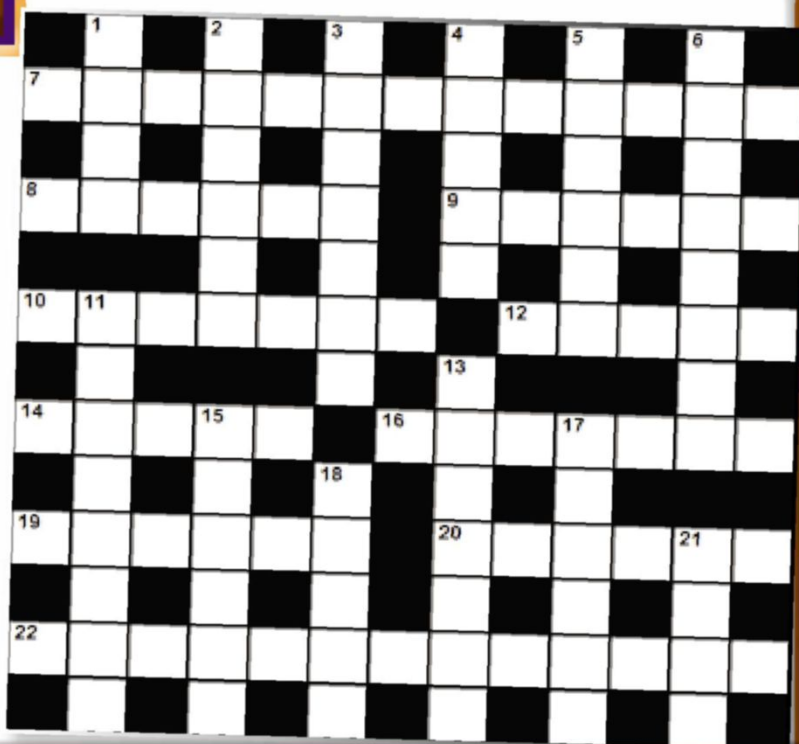
## THIS WEEK'S CROSSWORD

### Across

- 7 Ambitious person who sets up a business concerned with computers or the internet. (13)  
8 Gradually become wider at one end. (6)  
9 An immense cloud of gas and dust in interstellar space. (6)  
10 The collective discipline of study or learning acquired through proven methods. (7)  
12 One of the UK's earliest ISPs, offering dial-up internet access services from 1992 – currently operating as a brand of Vodafone. (5)  
14 Chemically inactive. (5)  
16 Statements that are obviously true and say nothing new or interesting. (7)  
19 .gn TLD (6)  
20 A small part that can be considered separately from the whole. (6)  
22 Judge Jeffreys trials of the supporters of the Duke of Monmouth after their defeat at the Battle of Sedgemoor in 1685. (6,7)

### Down

- 1 The prototype name for the Mega Drive platform video game Ristar. (4)  
2 Energise a battery by passing a current through it. (6)  
3 The manner in which an organization or activity is managed or directed. (7)  
4 In business a particular identity or image regarded as an asset. (5)  
5 Choose to make an optional function or device available for use. (6)  
6 US multinational semiconductor and telecommunications equipment company that designs and markets wireless telecommunications products and services. (8)  
11 Multiply by one hundred. (8)  
13 Exaggeratedly proper in thought or manner. (7)  
15 Given by a probability distribution rather than being deterministic. (6)  
17 The makers of personal and business accounting programs including Quicken and QuickBooks. (6)  
18 One of a class of woodland deities that looked after Bacchus. (5)  
21 A thought or suggestion as to a possible course of action. (4)



# In Next Week's Micro Mart...\*

- ◀ How the government is spending billions on keeping us safe online
- ◀ Why are young people getting caught out by online scams?
- ◀ Getting to grips with Twitch
- ◀ Plus all the usual news, reviews and more!



*\*May be subject to change*



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